November 1973

Smithsonian

A female orangutan named
Wallace is learning how
to become wild again (p. 26)

"I would like to create a cologne that will last as long as there are men and women."

PIERRE FRANÇOIS PASCAL GUERLAIN-1860

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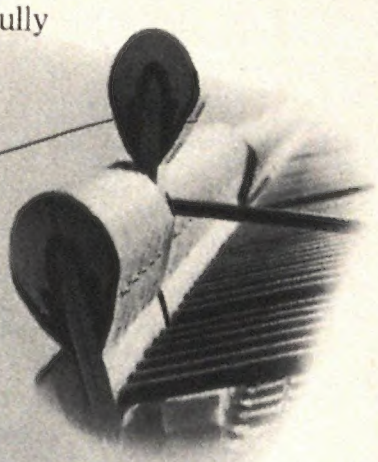

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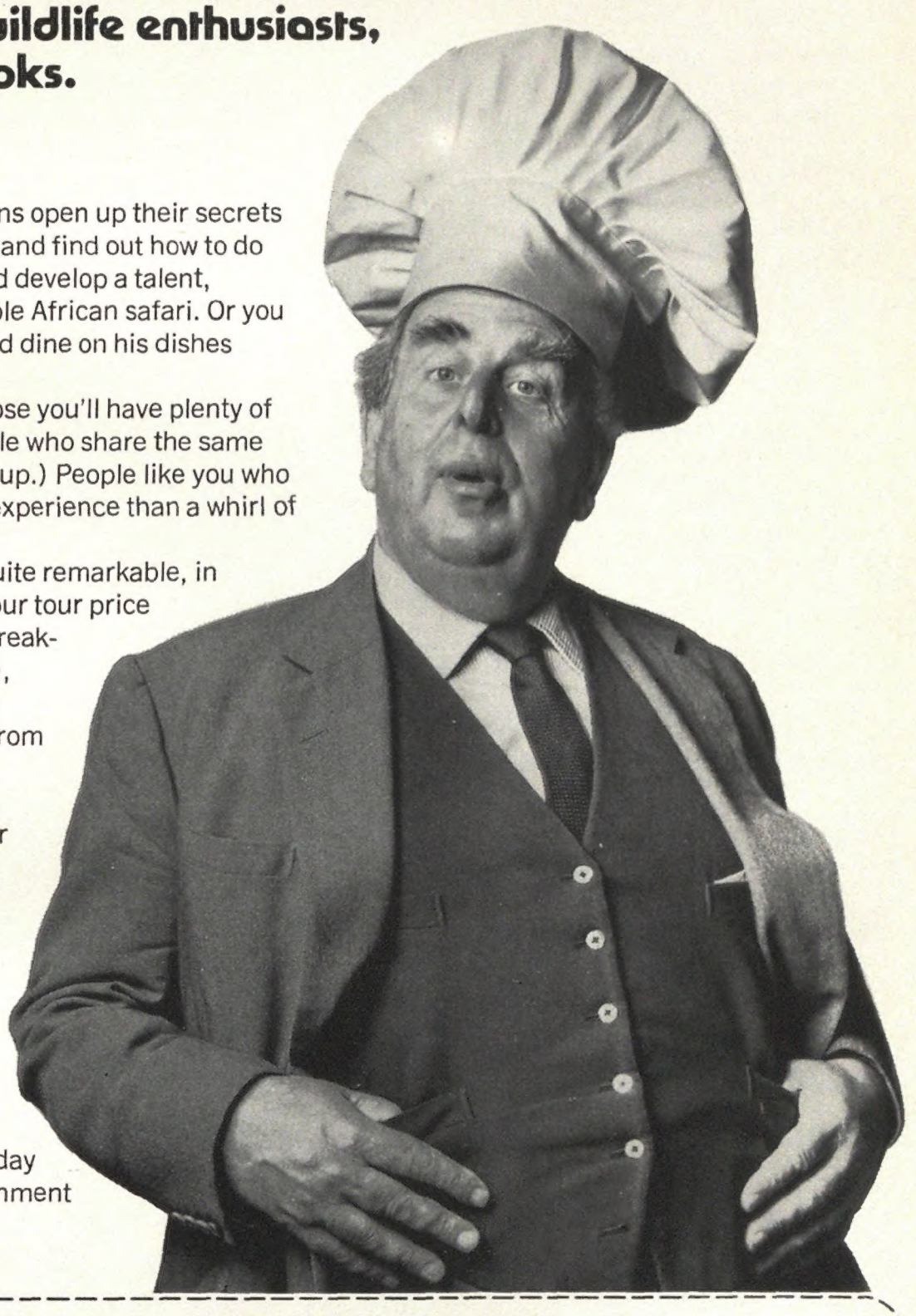

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The amazing story

It was made in England in the eighteenth century and it cracked the very first time it was rung on these shores. Yet for soldier and citizen it has remained an enduring symbol of Liberty and Freedom in the new republic. Read on about the Liberty Bell and about a rather shrewd investment some twentieth century Americans are making in it.

In 1751, the Province of Pennsylvania had a policy of individual freedom that much influenced the other colonies. It was fitting that when the Assembly of the Province decided to order a bell, they asked that on the bell's shoulder be inscribed the biblical phrase from Leviticus XXV. 10 "Proclaim liberty throughout all the land unto all the inhabitants thereof." Thomas Lester's Whitechapel Foundry in London was chosen to cast the bell and in September 1752, it arrived in America. Philadelphians gathered in the State House yard to hear it ring out. It cracked, however, upon the first strike, perhaps due to mishandling by amateur colonial bell hangers, eager to hear it. In 400 years, it was to be the only bell from Whitechapel's to have so cracked. "Two ingenious workmen", John Pass and John Stow recast it, but Norris did not like its tone and had it recast a second time. It was then hung in the State House tower; and for the next twenty years, it would ring out on the burning issues of the day. It loudly proclaimed the coronation of George III but was muffled as it sadly tolled the "death of liberty" when the Stamp Act was enforced in 1765.

THE BIRTH OF A NATION

On June 1, 1774, the bell was again muffled and tolled in sympathy with the people of Boston on the closing of their port. Following receipt of tidings of the Battle of Lexington, April 25, 1775, the bell called together 8,000 people (by computation) who assembled in the State House yard and agreed, unanimously, "to associate for the purpose of defending with arms, our lives, liberty and property against all attempts to deprive us of them."

The supreme effort of the bell to proclaim liberty was next in order. The historic second session of the Continental Congress was already underway, and the final break with Great Britain only a matter of weeks, perhaps days. The resolution sponsored by Richard Henry Lee was presented June 7, 1776, declaring "that these United Colonies are, and of right ought to be, free and independent states; that they are absolved from all allegiance to the British Crown and that all political connection between them and the State of Great Britain, is and ought to be totally dissolved;" In the interval, a special committee had been appointed to draft a formal statement. The Lee resolution was agreed to July 2, and the Declaration penned by Thomas Jefferson, after revision in the committee of the whole, adopted July 4. Then, on July 8, 1776, the bell rang to summon the patriots for the first public reading of the Declaration of Independence, which had been adopted four days earlier by the Continental Congress. The bell was now part of American history. The birth of an Independent Republic, the seed of a world power, was an accomplished fact. The old State House Bell, as it was then called, was now to "Proclaim liberty throughout all the land unto all the inhabitants thereof," to ring out independence, to have its sequel taken up in every town and hamlet, to set in motion a never-ceasing force against tyranny and oppression.

Before the advent of the second anniversary of liberty, the bell again added a dramatic chapter to its history. The echoes had not died away when it was realized the British army, under General Howe, was uncomfortably near Philadelphia. With the threat of British occupation of Philadelphia in 1777, the State House Bell, which had now become the Liberty Bell, was removed from the city to prevent it falling into British hands to be made into cannons along with the other city bells.

The Liberty Bell, and the ten other bells in the city, were loaded onto wagons which joined a 700 wagon train of refugees fleeing Philadelphia. The tradition has been handed down "that John Jacob Mickley hauled the bell fifty miles away to Bethlehem, where his wagon broke down; whereupon it was transferred to Frederick Leaser's wagon, who brought it on to Allentown." On arrival, the bell was hidden below the floorboards of the Zion Reformed Church for almost a year and returned to Philadelphia in the summer of 1778 when the British withdrew. Since then, it has pealed forth great news. It sang out, loud and clear, from Cornwallis' surrender in 1781, until it cracked permanently in 1835. It has been cautiously rung many times since with a rubber mallet. In 1944, on D-Day, its muffled sound was broadcast over network radio.

IN COMMEMORATION

To commemorate the 200th anniversary of the Declaration of Independence in 1976, the famous Whitechapel Bell Foundry of London (the same bellmakers who cast the original Liberty Bell) is casting a limited number of Bicentennial Liberty Bells to the original design and on the original site. The purchase price of the replica in the oxidized black finish (the same color as the 1752 bell) is $875. In polished bronze it is $925 . . . in .999 Silver plate it is $990 and in 22 karat gold plate it is $1365. These prices include duty, special crating, insurance and overseas shipment to the U.S.A.

The Bicentennial bells are exact in every particular to that cast in 1752 by Whitechapel's master founder, Thomas Lester, for the State House of Pennsylvania (now called Independence Hall). The Whitechapel Bell Foundry was founded in 1570 during the reign of Queen Elizabeth I. Many of its earliest bells are still in existence, including two bells at Westminster Abbey cast in 1583 and 1598. Among the recent bells from Whitechapel are those of Washington Cathedral, hung in 1964. The bells of Big Ben, which towers over the Houses of Parliament, were also cast at Whitechapel, as were the great bell of Bow in London in 1750 and the bells of St. Clement's in 1588, the year of the Spanish Armada. Both are remembered in the old nursery rhyme, "Oranges and Lemons."

Each Liberty Bell replica is made to the scale of one-fifth of the original, weighs approximately twenty pounds and stands 15½ inches high with the base. The plinth is hand-carved from oak, grown in Windsor Forest. A silver plate mounted on the plinth is fashioned from fine old English solid silver and carries the Whitechapel signature. Also, an additional optional silver plaque will carry the personal inscription of the subscriber. The bell itself is made in the manner of the original Liberty Bell, embossed with the quotation from Leviticus XXV. 10 in type face used by the original bellfounder, Thomas Lester. The clapper, drawn into a hand grip with a tasseled cord, strikes the walls of the bell and causes it to ring a perfectly-tuned note at each stoke. Each bell has been meticulously tuned (actually five partial tones are tuned together) to its final and perfect pitch—E Flat—the

same tone as the 1752 bell. The bell will have no crack! It will sing its song as magnificently as the original Liberty Bell did when Lester tested it before it left London. In this way, the ancient and historic contract between London and Philadelphia is fulfilled.

HOW TO MAKE A BELL

To make this reproduction possible, the Whitchapel Bell Foundry has incorporated and refined an ancient process which had not been used in bellmaking for over 600 years but has been used mainly to reproduce exact detail in fine metallic art work. This is the cire perdu or "lost wax" method of bellcasting, which was recorded most notably in the 12th century by the medieval monk Theophilus in his "De Diversis Artibus", but which was subsequently superseded by the "false bell" method. The principal advantage of the "lost wax" process—and an absolute essential in the making of the Bicentennial Liberty Bell—is the high quality of the resultant castings, particularly where intricate or decorative work is involved. The Liberty Bell has an inscription of 170 separate letters, and this inscription proved disappointing when cast normally at a scaled-down ratio of five to one. To

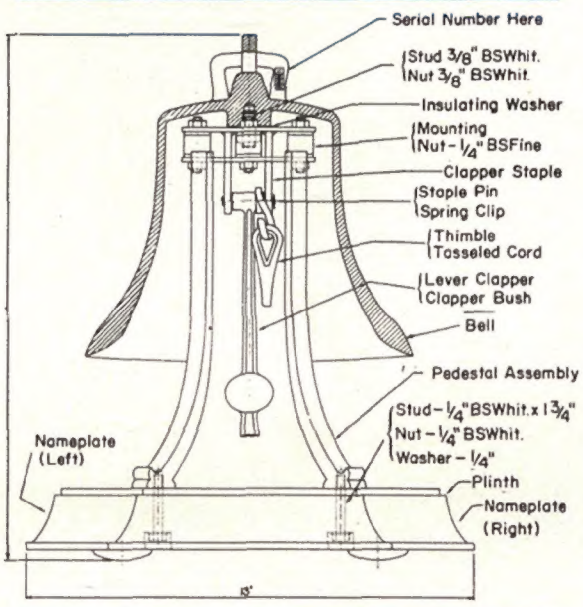
of the Liberty Bell

overcome this, and to preserve the clarity of the lettering at reduced size, the Whitechapel Bell Foundry evolved, after two years' research, a process which involved fashioning the primary pattern of the bell not in traditional clay but in wax of medieval bellmakers.

In essence, the technique at the primary stages is not dissimilar to that described by Theophilus, although now considerably refined. In short, it involves making a complete bell in wax, and then investing, or coating, this in a ceramic material.

PERFECTION OR DOOM

This ceramic material builds up very slowly in outer shell of some ten coats thickness, using a combination of first aqueous colloidal silica and then calcined china clay. This process, carried out by hand with immense care, is critical to the whole and takes about a week. Any error in the application can result in an imperfection, in which all of their exacting work is for naught, for each finished bell must be *perfect* or it is destroyed and consigned to the kiln.



The invested bell is then placed in a de-waxing furnace, which melts the original pattern, leaving only the ceramic shell—now the master pattern. This is baked at high temperature and provides the final mould from which the actual bell is then cast with molten bell metal. When the metal has cooled and hardened, the ceramic pattern is smashed away, leaving a magnificent bronze bell.

The casting, and all subsequent stages —such as tuning, polishing, and assembly —are done by conventional methods, the result being a bell of the highest authenticity. The process allows the foundry to capture the original lettering of 1752—the precise form of the letters used by Thomas Lester was checked by reference to dozens of bells cast by him and still in use in steeples all over England—while at the same time solving a secondary problem: the general surface finish is of a higher quality than is normally possible with bells of this size. Thus, these Bicentennial Liberty Bells bring together the 14th and the 18th centuries and bridge a gap that has lasted for 600 years.

MOUNTING

The mounting of the Bicentennial Liberty Bell has been carefully engineered and no detail has been spared to obtain absolute perfection. The bell is secured by a single center bolt inside its crown to a steel plate to which the jaws of the clapper staple are welded. The forged clapper swings between these jaws on a plated steel pin running in a nylon sleeve to ensure free silent action and perfect mechanical insulation. It is actuated by a silken tassel attached by a solid brass eyelet to a lever which is part of the clapper forging.

To provide the "give" necessary to insulate the bell and clapper together from the forged pedestal and oak base, and to enable it to absorb the occasional jolt in safety, the steel crown plate is connected to the pedestal through four special neoprene and rubber vibration mountings, which in turn are mounted on a steel ring which forms a common connection for the four "legs" of the pedestal. The lower ends, or feet, of these forgings are bolted through the oak plinth. In reducing a bell by scaling it down to one-fifth of its original size, the clapper must be reduced by the same scale to maintain the correct proportion; but while profiles can be scaled, "nature" cannot and the miniature clapper would not bring out the rich tone of the bell. This problem was overcome by introducing into the striking face of the clapper forging a "plug" made from a special type of nylon, which backed up by the weight of the clapper bell, ensures that the bell gives its full tonal resonance.

MADE TO ENDURE

Theophilus, writing on the intricacies of bell founding, stated "that the craft requires *not* indolent workmen, but keen dedicated men, for fear the bell be spoiled at some point in its manufacture." Whitechapel has ensured that nothing has been spared in the design and making of the Bicentennial Bells and their mountings and has fully maintained the ancient traditions of its craft. These bells have been made to *endure*. With proper care, there is no reason why they should not ring in the tercentary and quadricentary celebrations of these United States. Every bell is fully guaranteed—against any defect. And they are guaranteed *never* to crack!

Only 2,400 bells will be cast—each bell thus symbolically representing a separate month of independence. WHEN THE LIMITED EDITION IS COMPLETED, THE MASTER MOULD WILL BE DESTROYED. Only a limited number of Americans will ever have the privilege of owning one.

A PRUDENT INVESTMENT

Although the bells have been available but a relatively short time, more than 800 have already been snapped up by collectors, businesses, universities, and private individuals. Indeed a bell, purchased from one of the earlier castings, would already bring almost 23 percent more in resale at the established price.

While there are no direct comparisons, it is interesting to chart the continuous growth in value of certain other limited editions during recent years. The Winston Churchill Commemorative Medal struck in London in 1965 increased in value by 80 percent within two years. Perhaps the record is held by a pair of Dorothy Doughty quail, issued by the Worcester Royal Porcelain Company in 1940 as part of a limited edition, which fetched about $50,000 in a spirited auction recently. To take a more ordinary example, a porcelain figure of Princess Elizabeth, part of a 1947 limited edition, sold for $280 each, is now valued at over $4,000.

GOOD TO GET – GOOD TO GIVE

Of the over eight hundred bells thus delivered, each has been received with absolute satisfaction. Historical Societies, Foundations, Businesses, Churches, Museums, even Government Agencies, have been, without exception, well pleased. So, too, have the most finicky of private collectors. A number of generous subscribers have ordered the bells for the purpose of donating them to Universities, Colleges, and Museums. Some subscribers order one for themselves (and their families) and another to donate. Such a gift will be long-remembered.

If you wish to order a bell, we urge you to send your deposit at once to avoid disappointment. Since less than 1,600 replicas remain and the total readership of this publication is estimated to approach a million people, we must insist on the following terms; orders will be honored strictly on the basis of time of receipt, and we cannot guarantee early delivery of any order received after Dec. 15, 1973.

To commission the casting of a bell, simply make your check payable to "Liberty Bell Limited Edition" for $875; or, if you prefer, just send a $100 deposit. Mail your check to H. L. Sturges and Sons, Inc., 160 Old Derby Road, Hingham, Mass. 02043, the exclusive representatives for Whitechapel in America. Upon receipt of your order, you will be promptly informed in writing of the reservation of the casting of your bell. Each bell is fully and unconditionally guaranteed. They are not available in stores—nor will orders from stores be accepted.

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I wish to commission the casting of a Liberty Bell Replica. Please make a casting reservation, and assign a serial number to me. I understand that upon completion of my bell I will receive an owner's certificate and will be listed in your master founder's directory as the original owner. The bells in this limited edition are serially numbered in the order in which payment or deposits are received.

SELECT ONE FINISH

OXIDIZED BLACK ☐ .999 SILVER PLATE ☐ POLISHED BRONZE ☐ 22 KARAT GOLD PLATE ☐

Signature _____

Name (Please Print) _____

Street _____

City _____ **State** _____ **Zip** _____

☐ **Payment in full is enclosed**
☐ **$100 deposit enclosed**
☐ **I desire a special inscribed silver plaque**

The view from the castle

The death of the seventh secretary comes as a personal as well as a professional loss for the Smithsonian

Few people could rival the wit or charm of Leonard Carmichael. When his eyes twinkled and his eyelids fluttered and his mouth pursed, you knew that he was about to utter something loud, positive and usually anecdotal and entertaining. I always found him endlessly cheery, keenly interested and willing to listen, a good teacher without being repetitive. He was a man of dry wit, always ready with a hearty laugh.

Everyone seemed to love him during his long career as teacher and administrator at four universities—Princeton, Brown, Rochester and Tufts. Here, where he served as secretary from 1953 to 1964, it would be hard to overestimate the sense of personal as well as professional loss that the entire Smithsonian family felt on his death September 16.

Dr. Carmichael brought impressive credentials as well as personal charm to the Castle. He was renowned in his field of psychology, particularly for his work on the relation between the sense organs and behavior. He and a colleague demonstrated that the brain emits faint electrical impulses which can be recorded and analyzed; they published what is believed to be the first paper on the use on humans of the electroencephalograph. During World War II he directed the mobilization of scientists and engineers for such projects as radar and atomic energy.

Latterly I had known him as a predecessor at the Smithsonian, one of my "team down at the store" (SMITHSONIAN, July 1973). It seemed inconceivable to me that anything could happen to my predecessors, so secure did they make me feel in following old and honorable traditions of the Institution and so helpful were they in thinking of new ways to look at old things. I was prepared to go on this way forever. Perhaps it was selfish. I had no inkling that Dr. Carmichael's life and continuing career with our friends at the National Geographic Society and the American Philosophical Society would be cut short by the onset of cancer, or that the chain would thus be broken.

His career at the Smithsonian was made notable by three events. During his 11 years as secretary, he pushed forward and succeeded in realizing the concept of a great new institution, the National Museum of History and Technology, now the most frequently visited museum in the world.

In the 1950s he approached Harvard University and together with President Nathan Pusey helped create a pioneer consortium in Cambridge between Harvard College Observatory and the Smithsonian Astrophysical Observatory—one of the finest centers of its kind.

During that same decade he joined with the Commission of Fine Arts to save one of Washington's largest, finest and most historic buildings, the U.S. Patent Office, from the wrecker and the sordid asphalt, beloved of the parking lot millionaires. The epitome of American 19th-century aspirations, a makeshift hospital during the Civil War, this building has become a haven of beauty and inspiration for downtown commercial Washington, a promise and a centerpiece for the future of urban renovation, the home of the National Portrait Gallery and the National Collection of Fine Arts.

Truly, Leonard Carmichael created splendid works and left his mark on Washington.

S. Dillon Ripley

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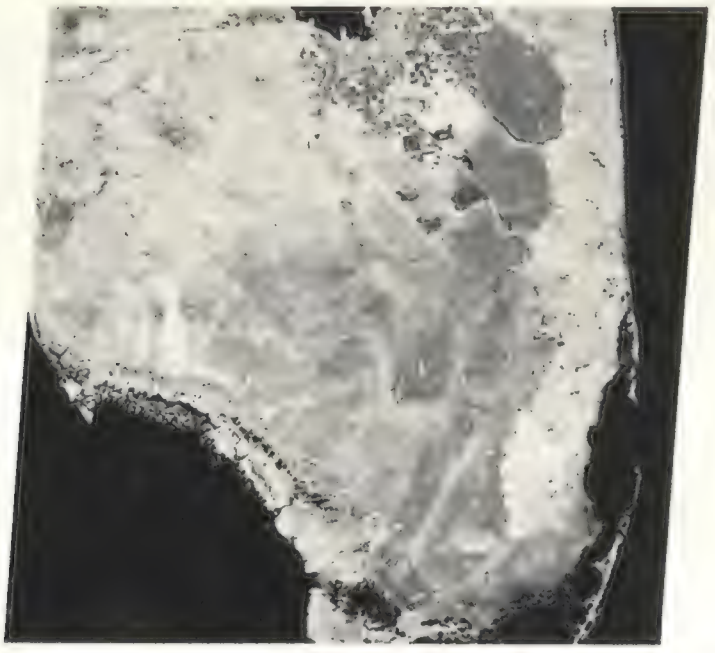
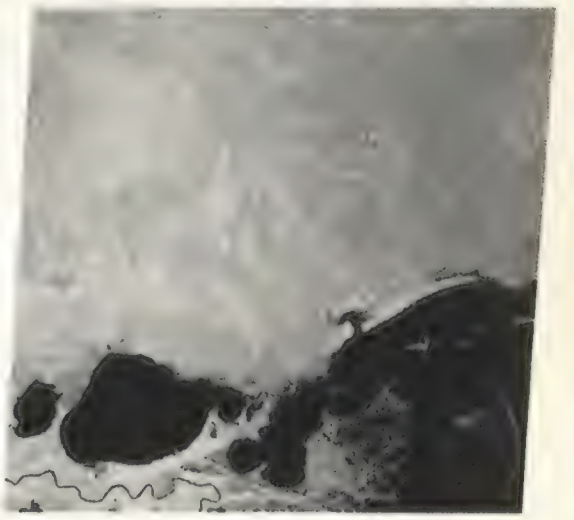
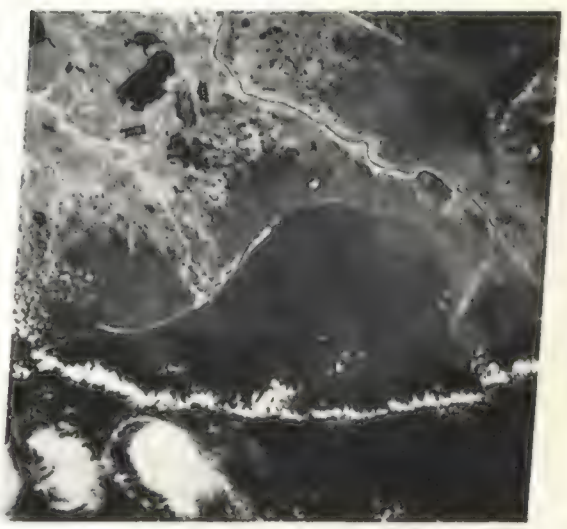


Miami and environs, 22 March 1973

New Orleans and environs, 7 August 1972



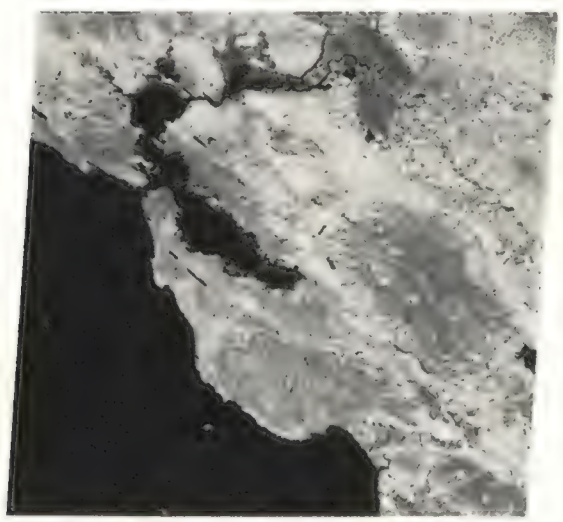


Mississippi delta, 7 August 1972

The U.S. Geological Survey, which runs the EROS program (Earth Resources Observation Systems), points out an opportunity to serve the public interest by calling to your attention that imagery is now available of just about any region on earth, except within some 900 miles of the poles.

Everywhere else, NASA's ERTS (Earth Resources Technology Satellite) goes over every 18 days 567 miles high, looking down in four wavelength bands: 0.5-0.6 μm, 0.6-0.7 μm, 0.7-0.8 μm, and 0.8-1.1 μm. Anybody–grade school teacher, ranch broker, botanist, Cub Scout–with $1.75 to spend can have a 9″ x 9″ print of any place selected. The 9″ x 9″ will encompass 115 miles x 115 miles. Changes may be apparent from the previous pass.

For the sake of preserving the earth's glory, let's learn how to look through mankind's new microscope-in-reverse. Let's assume that if Aristotle and his friends had had even ordinary microscopes, we'd all be happier today.



San Francisco and environs, 4 April 1973

Details:

A quick way to get a look through that great new reverse-microscope in the sky is to phone 605-594-6511 between 7 a.m. and 7 p.m. Central Time. Tell what geographical area interests you and what you have in mind. You will be talking to a helpful, well-informed, and quite real person. His or her hand that isn't holding the telephone will be in contact with heavy computer power.

The computer will even know how much was under cloud each time ERTS passed over the region of interest. It might even report that the area was photographed in 1936 and that, if you'd rather have that black-and-white shot from 5,000 feet instead of infrared "false color" from 567 miles, you can so order. Or you might be told the same place was photographed by a Gemini astronaut with a hand-held camera or by completely automatic equipment from Skylab this year, and how would you like *that?*

The EROS price list reflects just the cost of reproducing the photographs. (The cost of the satellite is more widely shared.) A 40″ x 40″ color enlargement on paper, for example, is priced at $25. To avoid misunderstanding, you can take down the numbers of possibly interesting pictures and check them out on a microfilm browse reader at any of 19 locations in the U.S.A. before placing your order. Black-and-white copy negatives or color internegatives can be ordered if you wish to do your own printing. No copyright worries.

If you want to experiment with the color rendition of the bands to emphasize certain signatures, come in person any business day from 7:45 a.m. to 4:30 p.m. to EROS Data Center, 14 miles northeast of Sioux Falls, S.D. Scientific staff members are available there for consultation on instrumentation and interpretation problems.

Don't expect much, though, by way of direct interpretation. *That* the customer does, or consultants the customer may engage, assisted by a fast-growing literature. Aerial photography and the interpretation thereof are not leaving the private sector. On the contrary, those in the business welcome EROS as a tantalizer to swarms of new prospects.

EROS Data Center can also be queried by mail (ZIP 57198).

An article in *American Scientist 61*:175 can take you farther into this fascinating subject. Address reprint requests to Eastman Kodak Company, Dept. 55W, Rochester, N.Y. 14650. But get in touch with EROS, not Kodak, if you want a picture of the old home town from 567 miles up.

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Phenomena, comment and notes

A black hole for the Russians, the meteor with superb timing and the ongoing case of Neanderthals

For a while there it seemed that Neanderthal man had been rehabilitated and was slipping closer to the mainstream of human evolution, but the situation remains fluid. As has been reported in these pages, Neanderthals are known to have buried their dead with flowers, a clear sign of humanlike sentiment. But then a British scholar found that Neanderthals' thumbs were barely opposable and, without our opposable thumbs, anthropologists imply, we humans would be oafs. Yet even oafs talk, and now two scientists have looked into the Neanderthal vocal tract and found what could be bad news for Neanderthal sympathizers.

A totally reconstructed Neanderthal.

Philip Lieberman, a linguist from the University of Connecticut, and Edmund Crelin, an anatomist from Yale University, modeled the talking apparatus of contemporary human adults and newborns, chimpanzees and fossil hominids, including the classic Neanderthal from La Chapelle-aux-Saints in France. Reconstruction from the fossil skulls was based on anatomical clues such as the marks muscles leave on bones, and a computer helped determine the possible range of sounds that could have been made by each type of vocal tract. They concluded that classic Neanderthal man just didn't have the equipment to produce the full range of sounds (particularly certain vowels) necessary for human speech, although other fossil hominids may have.

Many anthropologists object to these findings about Neanderthals and, while that debate continues, Lieberman may have started another among zoologists: He believes, from the modeling, that chimps have the ability to produce enough sounds and manual gestures to establish a useful language of their own. "Perhaps we're just too dumb to understand what they're saying," says Lieberman. Or perhaps the chimps just don't want to interrupt.

The job cycle

It was not too many years ago that severe unemployment flared up among physicists and engineers. It was definitely a time of woe and the idea of a PhD physicist driving a cab was shocking.

The situation is improving, at least for physicists and engineers, *Science* magazine reports. Their unemployment is now below two percent. (Some have been reabsorbed into aerospace firms that have themselves got into the transportation business—and there's probably nothing wrong at all with the idea of a transportation expert who has put in some time driving a hack.)

The problem now is in biology. Unemployment has jumped perhaps as high as six percent in this field, which is above the national average. In this case it seems that young people are taking up biology despite the paucity of job openings. *Science* reports that biology has become the largest undergraduate major at Stanford, for example.

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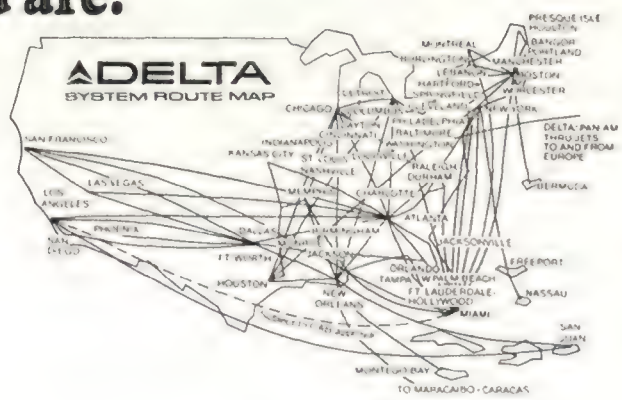

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One must sympathize here, too. Biology is, after all, the science of life—of food, health, and environmental awareness—and society might do well to find these people jobs.

The mathematics of track

Let us not, however, worry about the employment of mathematicians. There will always be some area of human endeavor which requires their insights. Lately a math professor named Joseph B. Keller put himself at the service of future track stars by formulating the principles upon which footraces should be run.

His findings, reported in *Physics Today*, suggest that in a race of 300 meters or less the runner should take off and keep accelerating to the end. In longer races, one should accelerate for about two seconds to some ideal velocity and hold it until petering out in the last few paces. This is mathematically to be preferred to ending a race with a crowd-pleasing spurt.

Perhaps some mathematician will next tackle a problem for all of us deskbound (and lazy) spectators: that is, how we can get the maximum exercise from the minimum effort.

The black hole of Siberia

The black hole is clearly an idea whose time has come. Almost daily one runs into more theories about these end products of stellar collapse which occur, astronomers assure us, when a star has grown infinitely small and infinitely dense (see SMITHSONIAN, July 1973). It now seems that a black hole may have passed right through our neighborhood 65 years ago.

On June 30, 1908 there was a gigantic explosion in the wilderness of central Siberia near the River Podkamennaya Tunguska. Among other phenomena, witnesses from miles distant saw what seemed to be a blue tube glowing in the sky. Years later, meteorite hunters—a special expedition of the USSR Academy of Sciences—went to the scene and found several hundred miles of forest damaged, with trees uprooted and scorched, but, frustratingly, no crater and no meteoritic material. A variety of theories have since been advanced to explain this nagging mystery—including the suggestion that a piece of antimatter slipped into our atmosphere and, on confronting matter,

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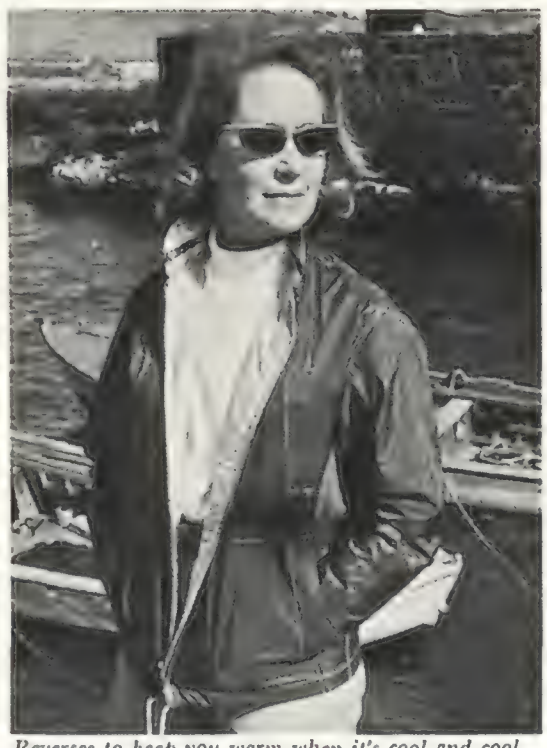

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blew up. The newest suggestion is (you guessed it) an errant black hole.

A. A. Jackson IV and Michael P. Ryan jr. at the University of Texas in Austin have reported to *Nature* their calculations that a small black hole falling to the Earth would generate a shock wave sufficient to do the damage. It would also radiate a column of ionized gas behind it that, they say, would appear deep blue. And being so infinitely tiny and energetic, the black hole would zip through the Earth and come out the other side just like a cosmic bullet.

For any scientific Hawkshaws who wish to sleuth around the black hole's point of exit for clues, the two Texans provide map coordinates: 40-50 degrees N., 30-40 degrees W., which is in the North Atlantic. Since a black hole would also have generated shock waves on departing, the evidence to check this new hypothesis may lie in old barometric records and ship logs gathering dust heaven knows where.

Unprecedented brevity

Black holes cropped up elsewhere as the subject of what a *New Scientist* reporter found to be the shortest question-and-answer period during a week of scientific meetings of the British Association in Canterbury:

Participant: "Did the big bang start with a black hole?"

Speaker: "I don't know."

Chairman: "Next question, please."

A tough act to follow

If the Tunguska Meteorite proved uncooperative to science by disappearing, the ledgers were nicely balanced late last summer at Breezy Hill, which is near Springfield, Vermont.

According to the Smithsonian's Center for Short-Lived Phenomena some 40 people had gathered under the stars when, shortly after midnight, there was a glow in the northern sky. The nocturnal assemblage looked up to see a fireball, yellowish-red in color, moving slowly above the treetops along the horizon. After several seconds it flared brightly in the sky and disappeared.

"No noise was heard," reports a witness, except (one can imagine) a round of applause: The gathering at Breezy Hill was a meeting of the American Meteor Society. The question now is: What does

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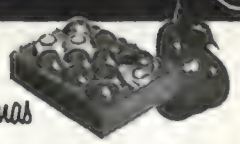

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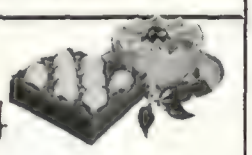

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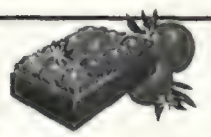

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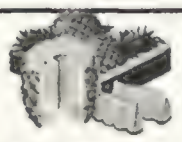

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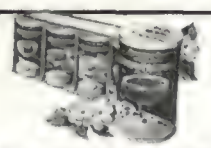

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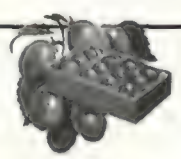

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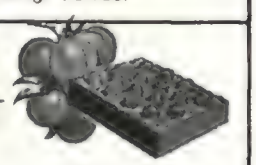

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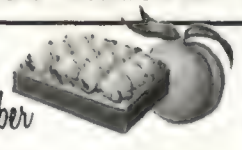

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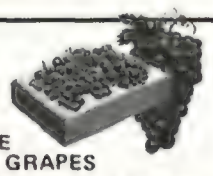

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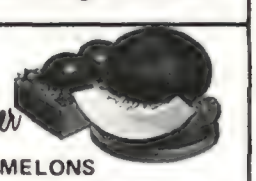

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the association plan for entertainment at its next meeting?

Getting things known

Before long almost everyone connected—however tangentially—with scientific matters feels the urge to pontificate about science. As this column swerves out of anonymity this month, the temptation will be indulged here just this once—and never again.

A recent poll has reassured the National Science Foundation by telling it that 70 percent of all Americans feel that science has been generally beneficial. There are of course extreme views not shown in this poll: A few people (most of them scientists) see science as the crown of civilization; others believe it to be the seat of evil. Both sides may be right, but one thing *can* be said of science: Unlike other exalted human endeavors, such as the arts and the law which also seek the truth, science is quintessentially progressive and fair.

In the tradition of Western scientific inquiry, at least, a theory works or it doesn't (technology is quite another matter). Scientists have to publish their results in as precise a manner as they can (often requiring language that seems to us laymen like deliberate obfuscation). The results stand or fall on their own merits. Bad science always fails sooner or later; good science holds out until replaced by even better science. Salesmanship simply doesn't work in the long run and no other profession can make that statement.

Sometimes, of course, jargon overcomes thought; a prior investment in a concept can delay the acceptance of a more appropriate one. Scientific knowledge can be—and is often—misused. And sometimes the the little parcel of truth a scientist seeks to illuminate seems downright silly. Nevertheless, whether you like it or not, the self-corrective system of accumulating scientific knowledge is by far the closest we have yet come to a foolproof and just means of inching towards the truth.

That is something worth keeping in mind whenever one enters the expanding storehouse of scientific insights and oddities and rummages around with wonder, delight and, now and then (it must be confessed), befuddlement.

JAMES K. PAGE JR.

Conversation Pieces

Technically intriguing items from TRW, guaranteed to add luster to your conversation and amaze your friends.

Is anyone out there? The question of whether life is unique to planet earth has long fascinated the mind of man. As early as the 4th Century B.C., the Epicurean philosopher Metrodoros said, "To consider the earth as the only populated world in infinite space is as absurd as to assert that in an entire field of grain sown with millet, only one grain will grow." In the sixteenth century the heretic Giordano Bruno announced that "innumerable suns exist" and "innumerable earths revolve about these suns . . . Living beings inhabit these worlds."

Harvard astronomer Harlow Shapley approached the problem statistically. Of the 10^{23} stars in the universe, said Shapley, it is probable that 100 million have planets similar enough in composition and environment to earth to support life.

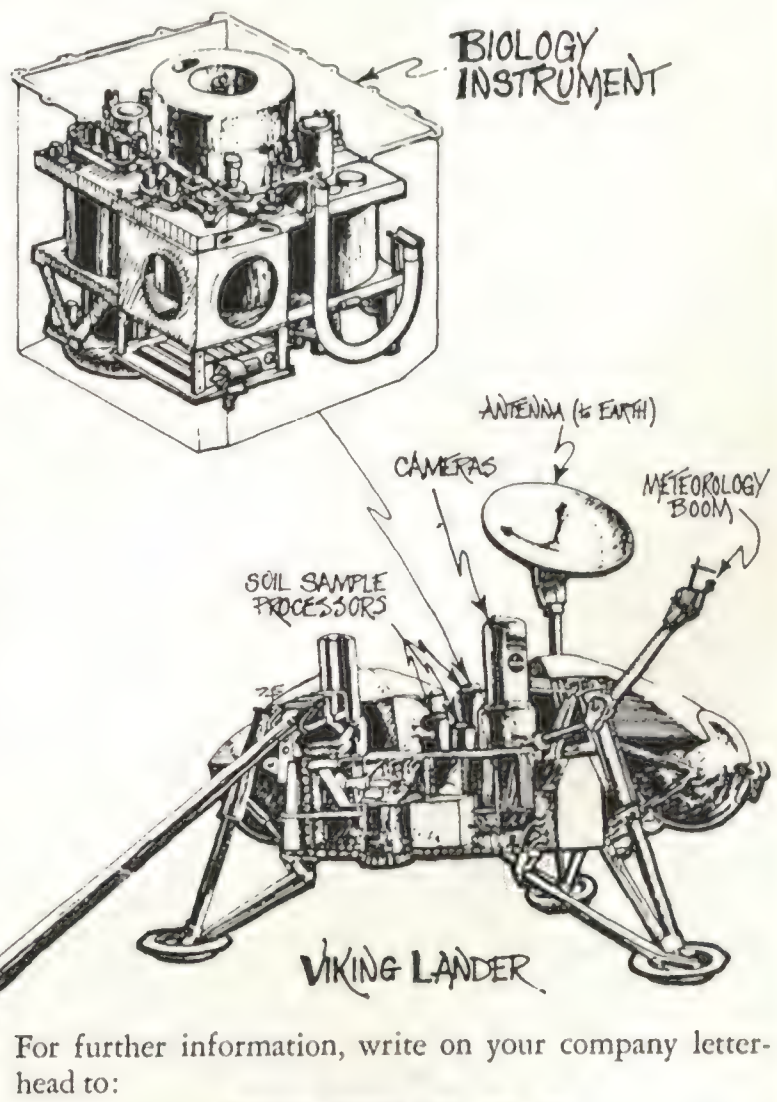
Although scientists cannot as yet positively assert the existence of extra-terrestrial life, enough evidence has accumulated in the last decade to make some of the world's leading scientists suspect that the question has a positive answer. The evidence is circumstantial, but, as Thoreau said, some circumstantial evidence can be very strong, as when you find a trout in the milk.

First of all, scientists have shown that the building blocks of life are rather easy to produce. In 1953, Stanley Miller of the University of Chicago made amino acids by passing electrical discharges through a mixture of gases that simulated our earth's early atmosphere. Later, Sidney Fox of Florida's University of Miami produced protein fragments which formed themselves into bacteria-sized spheres.

Not only does life seem easier to synthesize now than it did twenty-five years ago, but the survivability of life under presumably lethal conditions has been demonstrated. Organisms have been found living happily in boiling water, strong acids, and even in the water shielding the highly radioactive cores of nuclear reactors.

Recently, biologists have simulated the biologically rigorous conditions of the Martian environment in "Mars jars." Some of the organisms placed in the jars readily adapted themselves to the extremely cold carbon dioxide atmosphere.

As a subcontractor to Martin-Marietta, TRW Systems is at work on a NASA project which may shed some light on the question of extraterrestrial life. We are building the Viking Lander Biology Instrument, three tiny, fully automated laboratories, which will be landed on the Martian surface in 1976. On earth, these laboratories would occupy several rooms and a full crew of scientists. We are shrinking them into a single foot of space. We hope you're interested as we are in what Viking will find.



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Letters to the Editor

Swedish prisons

Dear Sir: I simply cannot conceal my concern, dismay and anger at your article in the September issue, "For the Swedes a prison sentence can be fun time." Your depiction of the "good life" in Sweden is to say the least in poor taste. It glorifies the benevolency of the Swedish government toward social misfits—hence, innately implying our systems are archaic. I particularly object to the sprawling picture of the prisoner with his family in the "love room."
Dr. J. J. Licata
Suffern, New York
As the article pointed out, "Sweden has made little effort to evaluate the effects on crime, rehabilitation and recidivism, and, until it does, the system lacks value for other countries." As to the picture, it describes conditions prevailing in Swedish prisons, for better or worse, and the "love room" is definitely part of that system. The prisoner shown was in his own room at a minimum security prison. Ed.

Dear Sir: I was utterly dismayed by your article on Swedish prisons, which seems to me biased and unfair.

Your article suggests that the progressive attitude taken by Swedish penologists does not make sense. I would think, for example, that the Swedish concern for slaughter on the highways could well be copied in our nation with our alarming death rate caused by drivers who have been drinking.

I see no reason why a prisoner should not tell a girl he was a prisoner. Are you suggesting that our method of total condemnation makes better sense? Is our system of disrupting family ties and fostering homosexuality preferable to the Swedish system?
Vernon J. Lisbon
Regional Director, The National
Conference of Christians and Jews, Inc.
Providence, Rhode Island
The article neither condemns nor condones the Swedish system, but it quotes an English penologist who is in the process of evaluating it in comparison to other systems. Ed.

Tom Thumb

Dear Sir: Your article on Tom Thumb states that he and his wife never had any children, but a photograph I recently came across seems to prove you wrong.
Sarah C. Brooks
New York, New York

The picture (above) is a hoax. In 1881 P.T. Barnum hired infants wherever the circus went and had the childless Tom Thumbs pose with a baby. He sold the photographs for 25 cents each to a gullible public. Ed.

Dear Sir: Your article on the Tom Thumbs was particularly interesting to me because my great-uncle John O'Brien saved their lives while they were visiting in Milwaukee. In January 1883 a roaring fire broke out in the Newhall House where they were staying. My great-uncle,

This is a soft drink bottle before it's born and after it dies.

About 73% of glass is sand—the most common substance in the earth's crust. It's this natural composition that appeals to the nation's homemakers. They like what glass shows them about the products they buy. They like the purity of glass and its re-sealability. They like the fact that glass protects the flavor of food and beverages.

Equally important, it's this natural composition that makes a glass container an ideal environmental package. It can be returned to the earth in virtually its original form.

Of course, not all glass goes back to the earth. But because glass is recyclable, more and more is going back to the industry for making new glass bottles and jars.

The glass industry is also continuing to develop new uses for used glass such as road paving material, construction panels, bricks, insulation, terrazzo and reflective paints.

When you add it all up, it's easy to see why consumer preference for glass containers continues to grow. In terms of its attributes, its utility and recyclability, glass is a natural.
For a copy of "The glass container story," write: Glass Container Manufacturers Institute, Dept. B, 1800 K Street, N.W., Washington, D.C. 20006.

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a fireman with the Milwaukee Fire Department, carried Tom under one arm and Lavinia under the other down a ladder from the fifth floor to safety. Tom gave John a gold watch, inscribed on the back with his and Lavinia's names.
James G. O'Brien
Milwaukee, Wisconsin

Dear Sir: The "regalia" Tom Thumb is pictured wearing is the uniform of the Masonic order of Knights Templar, which he joined in 1863 at Bridgeport. When he took the degrees, another candidate, six-feet-three-inches tall, towered over Tom who measured only 35 inches.

After Tom's death, the body was taken to Bridgeport and lay in state at St. John's Episcopal Church with a Knights Templar guard of honor. An escort of Knights Templar and other Masons marched three abreast in the procession, behind a band playing the funeral dirge, to Mountain Grove Cemetery.

Full Templar honors were accorded Sir Knight Tom at the grave, which is revisited each Fourth of July for a wreath-laying ceremony.
James R. Case
Historiographer, Grand Commandery,
Knights Templar of Connecticut
Bethel, Connecticut

Dear Sir: Theodore James' article on Tom Thumb was not only entertaining but pertinent. On a somewhat lesser scale, perhaps, the Billie Jean King versus Bobby Riggs tennis match relates to the Watergate crisis in the same way that Tom Thumb's wedding related to the Civil War. Thus, a massive segment of a population badly in need of diversion followed closely the ballyhoo of the outrageous spectacle of September 20, just as so many people focused their interest on Tom Thumb more than 100 years ago.
Frank N. Schubert
College Park, Maryland

African drought

Dear Sir: I was most distressed by the conditions you described in your article on drought and famine in Africa.

I am a 30-year-old mother and want to do something to help feed a hungry child. Please give me the names of organizations to contact.
Mrs. Carol A. Owens
Douglaston, New York

Mrs. Owens, and the many others who have written, may wish to get in touch with any of the following volunteer organizations: Africare, 2204 R St., N.W., Washington, D.C. 20008; Catholic Relief Services, 350 Fifth Avenue, New York, New York 10001; Church World Service, 475 Riverside Drive, New York, New York 10027; Operation PUSH, 930 East 50th St., Chicago, Illinois 60615. Ed.

Taxonomy

Dear Sir: I found Howard Evans' article on taxonomy inspiring until he made his derogatory remarks concerning moon exploration. Those "few sterile rocks" along with the other scientific data are telling us a great deal about the moon and the rest of the universe, including what he refers to as "the living Earth."
Earl Devereaux
Guyton, Georgia

Dear Sir: I spent about 20 minutes just looking and giggling at the animal illustrations in the taxonomy article. Fred Gwynne is a fine artist.
Kay R. Sluterbeck
Van Wert, Ohio

Chinese archaeological treasures

Dear Sir: The article about the exhibition of art treasures from China was marvelous. Can you tell me where and when it may be seen in London, and when it will come to the United States?
Mrs. Edward C. Reed
Dallas, Texas
The exhibition is currently at the Royal Academy of Arts in London, where it will remain through January. The People's Republic of China has agreed to send it to this country, but at present it is not possible to say when it will come here. Ed.

Dowsing

Dear Sir: Lest your serious readers be misled by H. Allen Smith's whimsical article on dowsing, I wish to testify that it works.

Some years ago, I watched a Public Works' foreman locate a waterline with the use of a dowsing fork. I insisted on trying it myself and found to my amazement that I had the Power! I no longer pooh-pooh it, but can't explain it.
Joseph McDowell Mitchell
Lake Alfred, Florida

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200 years ago this month

Angry Colonists unite to keep hated tea from landing

This column turns back the calendar two centuries and each month places the reader within the dramatic events that led up to our American Revolution.

NOVEMBER 1773

Five ships and two brigs, all laden with cargoes of tea, are on the Atlantic, clawing westward from England against cold autumn winds. The ship *Polly* is bound for Philadelphia, *Nancy* for New York and *London* for Charleston. The ships *Dartmouth* and *Eleanor* are headed for Boston along with the brigs *Beaver* and *William*. In each of these Colonial cities, people eye the waterfronts in growing consternation, laying plans to keep that tea—a British East India Company monopoly with the disputed three-pence-a-pound tax still on it—from reaching the American market.

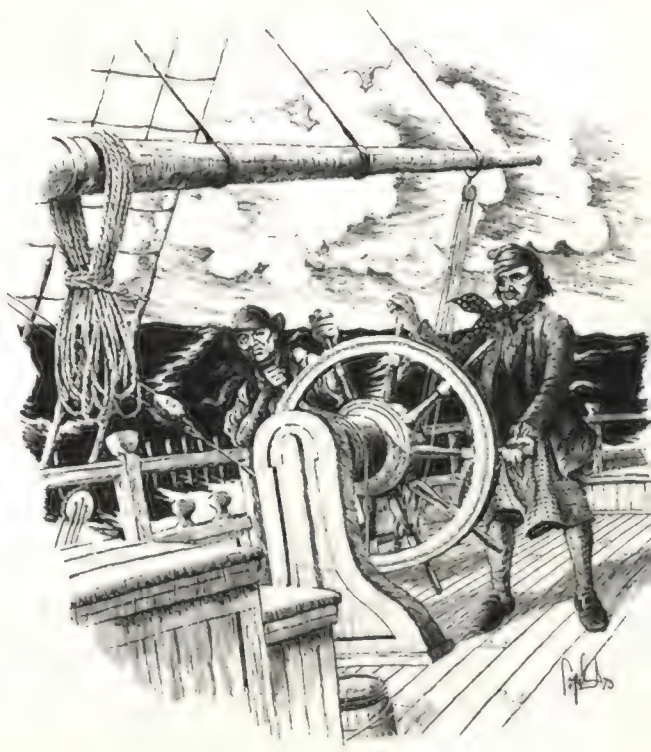
In the merchant town of New York, compact on its island, with warehouse roofs, Dutch-style gabled homes and church steeples marking its skyline, anti-tea handbills flood the streets. Demonstrations erupt, especially on Guy Fawkes Day ("Remember, remember the fifth of November—gunpowder, treason and plot!"), and the consignees of the tea are finally discouraged enough to resign.

Philadelphia, despite its size and the elegance of its broad streets and handsome old houses, comes up with the most inhumane suggestion of all for the captain of the ship *Polly:* "a Halter around your Neck, then Gallons of liquid Tar decanted on your Pate—with the Feathers of a dozen live Geese laid over that to enliven your Appearance."

Boston's consignees are hard to crack. Governor Hutchinson stands behind them, for two are his own sons and the merchant firm of Richard Clarke & Sons is connected by marriage. Mobs and threats do not move "Tommy Skin-and-Bones" Hutchinson. He's used to them.

Then late in the month a ship feels her way past Boston's sheltering shoals and islands and with a rattle of chain drops anchor in the harbor. It's a quiet Sunday, but the news races through town: *Dartmouth* has arrived with 114 chests of tea stowed in her hold. The other vessels must be close behind her.

The selectmen meet, Sabbath or no, and send word to a young relative of the Clarke family, an artist named John Singleton Copley, that they await whatever suggestions the consignees may have up their sleeves to break the deadlock. Sometime after midnight, early Monday



morning, handbills appear, tacked to trees and fences along the city streets:

FRIENDS! BRETHREN!
COUNTRYMEN!

> That worst of Plagues, the detested tea, shipped for this port by the East India Company, is now arrived in the harbour, the hour of destruction, or manly opposition in the machinations of Tyranny stares you in the face; Every Friend to his country, to himself, and to Posterity, is now called upon to meet at Faneuil Hall at nine o'clock in the morning this day, at which time the bells will ring to make united and successful resistance to this last, worst, and most destructive measure of Administration.

Some 5,000 Bostonians show up. Faneuil Hall can't hold them, so they move to Old South Meeting House, overflow it and jam the streets. They come back on Tuesday, orderly but determined to keep the tea out. Copley seeks to compromise. The consignees agree to store the tea until they get instructions.

Dartmouth warps up to Griffin's Wharf, nudging the worn planking. A watch of 25 townsmen, designated on the 29th, guard the cargo.

The excitement is so intense in Boston that it is hard to realize that life goes on in other centers. Down in New York, ambitious young Alexander Hamilton, determined to live down his bastard birth, is plunging through his studies at King's College as a special student. It is unlikely that he knows Jacky Custis, who is a very poor student, the despair of his stepfather, George Washington. In East Haddam, Connecticut, another young man, fresh out of Yale, is teaching school. Name of Nathan Hale.

Out in the wilderness country, over the mountains from North Carolina, Daniel and Rebecca Boone face the winter in numbing grief: Their son James has been shot and tortured to death by Indians.

And in London, George III notes approvingly that Queen Charlotte is pregnant again—the tenth time.

As this month ends, Boston faces its usual bleak winter with the sickening feeling that a monumental confrontation is inevitable.

EDWARDS PARK

Next month: Boston dons its warpaint.

Meet Jenny Redhorse... She's About to Become the Latest American Indian Tragedy

BUT YOU CAN KEEP IT FROM HAPPENING.

In today's America Jenny speaks only Navaho. She lives with her parents and six brothers and sisters in a one-room log hogan, without electricity or running water. Their only income is a few dollars her mother earns by weaving. Her father—like 65% of the Indians in the area—is unemployed.

But for Jenny, the worst tragedy is yet to come: Soon she will drop out of the third grade—because her family simply can't provide the clothes she needs for attending school. Uneducated and unmotivated, Jenny will be at a dead end before she is even 10 years old—with nothing ahead but the same barren, desperate life of her parents.

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An orangutan named Joan, who has yet to break her ties with people, cavorts with her baby on her head.

Text and photographs by Carl Mydans

Orangutans can return to the wild with some help

These apes, once kept chained under huts for their owners' amusement, are learning to live the treetop life they were born for

Joan had never before paid any attention to me. She seemed always to be looking for something, fussing among the vines and leaves, shifting her baby from hip to hip. Whenever I tried to approach her, she kept her distance.

Then one morning I heard something behind me and there she was, dressed in glowing auburn-red, coming directly toward me. She climbed onto a great moss-covered log and sat without uttering a sound, somberly taking me in.

"Good morning," I said. And she hoisted her baby from her lap and put him on her head like a hat. What appeared to be a faint smile developed and she seemed to be waiting for applause.

"Great!" I exclaimed. Then she took the baby by both feet and hung him upside down. He seemed perfectly content, watching my topsy-turvy image, his tiny jet-black eyes in his tiny jet-black face as somber and wistful as his mother's.

Then Joan got up and, tucking the little fellow under her arm, went off again as though there were still many things to be done that morning.

Joan and her baby Johnnie are orangutans, members of the least-known species *(Pongo pygmaeus)* of Man's closest relatives, the apes. They live in the Sepilok forest in a remote corner of northeastern Borneo, a part of Malaysia. They are not quite wild, but it is hoped that they soon will be—for that is the goal of an extraordinary experiment that is being carried out at the orangutan rehabilitation center in Sabah.

Once, it is thought, there were at least half a million orangutans inhabiting vast reaches of Asia from the Celebes to North China. Barbara Harrison, author of the charming book *Orang-utan,* says that in the early Christian era there were probably more orangs on Borneo than there were men. A recent estimate places the orang population in Borneo today at 9,000, a level that cannot be maintained much longer.

As with many other wild animals, the orangutans face eventual extinction from the encroachment of Man. With the possible exception of the clouded leopard, Man is their only enemy. Not only has Man from ancient times hunted them for food and, more recently, for his zoos, but today he is inexorably diminishing their arboreal world by cutting down their primary jungles for farms and factories and towns, and lacing their forests with roads.

Unlike most other endangered species, the orangutan has suffered an additional threat from Man. It is a sad irony that men find these apes so humorously manlike, such irresistible caricatures of themselves, that they capture and cage them or tie them in their yards for amusement. In most instances, they seize them when they are infants; to get them, they kill their mothers. In this way men are helping to drive to ex-

Perhaps half a million orangutans once roamed Asia (orange area), outnumbering men in places; now they survive on Sumatra and Borneo.

Orangutans return to the wild

tinction these creatures they like so much and want to keep.

Hundreds of orangutans live behind bars in zoos or are held captive as pets. And it is with these pets that one of the most unusual experiments in animal history is being undertaken. In the first determined move to save the orangutan from extinction, animal scientists in Sabah are retrieving these captive animals and teaching them to be wild again so that they can be put back into the forest where they will procreate and help save their species.

Stanley de Silva, a Ceylonese working in Borneo, conceived the idea of a halfway house for orangutans.

This experiment is being carried out under the direction of a dynamic Ceylonese zoologist, Stanley de Silva, assistant chief game warden of Sabah, who conceived the program. And the "laboratory" in which it is conducted is the rain forest itself.

The Sepilok Forest Reserve is 10,000 acres of virgin jungle lying some 15 miles inland from the port of Sandakan at the north end of Borneo. Despite its impressive title, "The Sabah Orangutan Rehabilitation Project" is little more than a vast jungle of tall saraya trees, which rise to tremendous heights without a branch or fork and spread a canopy far overhead, and of ironwoods, palms, bamboo and thick sprouting undergrowth, all tangled with vines and budding greenery and smelling of rich, wet plant life.

Within this wilderness is a tiny clearing in which stands a small frame cabin on stilts that is called the "halting bungalow." In it live the young rangers who patrol the preserve and keep a record of the tame and semiwild orangutans that have been brought to the center, and of their success in adapting themselves to live without human help.

The program was started in 1964. "We had had a law passed," says Stanley de Silva, "that made it a serious offense to kill or capture or hold orangutans in captivity. But we soon realized that would not be enough. We had to make it possible that every orang in the state had an opportunity to produce offspring. And that meant those who were already captives. But because the animals we reclaimed had forgotten how to live as wild orangutans and could not survive in the jungle, we had to prepare a program to awaken their dormant instincts to feed and roam and survive on their own."

In the nine years that the experiment has been under way, 51 animals have been absorbed into the project, all of them reclaimed captives. Some died, but of the rest all except eight have disappeared into the forest to become wild again. Sometimes a ranger may spot one at a distance but it moves off again before it can be positively identified. These are the ones who have been successfully rehabilitated, and it is they who make the Sepilok project a success.

Some hesitate to break away

The eight still remaining—Joan among them—linger in the vicinity of the bungalow, presenting a problem derived from orangutan memory: They have not forgotten that humans provided for them in the past. And although most of them are now capable of living in the wild, they keep returning irregularly, suddenly appearing in the trees at the edge of the clearing, watching and waiting for the fruit they know will be given them.

"These," says de Silva, "will probably continue to return unless we force them to take the final step. They are capable of taking care of themselves, but the link with humans is hard for them to break. To deal with this problem, we shall take all the suitable animals that remain—those that we know can make it on their own—and carry them to distant areas of the forest far away from human habitation and release them there."

When I first came to Sepilok, I asked how the staff could tell one orangutan from another. "By their faces!" one of the young rangers answered in surprise. "They are all different." And it is true. Joan, when I first spotted her, looked to me like any other orangutan. But after I had followed her through the forest for a few days her face became as familiar to me as that of a close friend. There was no mistaking her for anyone else.

Wallace made it easy

If I had waited until I met Wallace, I would never have had to ask how to distinguish one orang from another. Wallace is about three-and-a-half years old and, despite the name, is a girl. She was sitting overhead on a looping vine when we came upon her, a garish red-orange little figure against the jungle green. Her face and expression were markedly different. Joan's black eyes peer out of anxious wrinkles in her dark leathery skin. Wallace's face was lighter, and her features were set off by light tan eyelids and a rim around her lips (see photographs, p. 31). The next time I saw her I recognized her instantly, as easily as I recognized Joan.

I never saw Joan without Johnnie clinging to her or within reach, but otherwise she was alone. Orangutans are solitary animals, and are exceptionally silent. Although on occasion they may cry out when they are angered or annoyed, they utter no ringing calls in the forest to warn others or claim territory. And when one orangutan does encounter another, it seems to have nothing to say.

Males are somewhat larger than females and stand some four feet tall; their arms are almost that long, and heavy muscles bring their weight up to as much as 250 pounds. Orangs' feet provide them with a second pair of hands, but even so they cannot climb the smooth and branchless trunks of the saraya trees any more than a man can climb a telephone pole without manufactured climbing accessories. The orangs use the accessories of the rain forest: the network of vines and parasitic growths that hang from the upper branches. And they climb very much as a man might climb, even though that second pair of hands makes a man watching from the ground feel envious.

One of my surprises in observing semiwild orang-

Orangutans move with more deliberation than grace; semiwild ones sometimes miss a branch and fall.

utans was how often their judgment of distances was poor, how often they missed a branch they swung for or seized a vine that was too weak to hold them. When that happened, I saw on their faces a kind of embarrassment, it seemed, as when a man miscalculates and recovers himself with an "oops!"

Like the gorilla, the gibbon and the chimpanzee, orangutans are anthropoid apes. And though they share some characteristics with each of the other three, they are unique in many ways. They live in Southeast Asia, as do the gibbons, the smallest and most agile of the family. They are closer in size and temperament to their African cousins, the gorillas, but considerably shorter and less powerful. In contrast to the chimpanzees, which are extroverted exhibitionists, they are retiring by nature. And although they live in trees like the acrobatic gibbons and the agile chimpanzees, they move with quiet deliberation.

Man discovered long ago that they were good to eat; their cooked bones have been found in the Great Caves of Niah in West Borneo, which have been traced back as far as 35,000 B.C. And indications have been found there that even Stone Age man may have kept orangutans as pets.

The name orangutan is derived from the Malay words meaning "man" and "woods"—the man of the forest. In Java in the 1640s, a Dutch doctor, Jacob Bontius, noted: "The Javanese maintain these animals can speak but refuse to do so for fear of being made to work."

There are wild orangutans in the Sepilok reservation as well as those that are being rehabilitated, for the preserve is one of their natural living areas. To an untrained observer, a released semiwild orang is indistinguishable in the forest from a wild one. The animal scientist, however, discerns many differences, for the semiwild one has been influenced by what it has watched humans do while it was being kept as a pet.

One day when I was in the forest with de Silva, Joan came down to the forest floor and joined us. She has a special and long-standing affection for de Silva and she went through a variety of activities, showing off for his benefit. At one time she used a dead branch as a club, as though to pound a pole into the ground, much as a man might pound in a fence post.

"If an anthropologist saw this display and knew this animal was wild, he would be beside himself with excitement," de Silva said. " 'A wild animal using tools!' It would be of major significance. But this animal is semiwild, and what you are seeing is not an ape that has discovered the use of tools, but one that is simply remembering something she has seen humans do."

The recorded histories of the animals taken into the Sepilok center reveal not only the behavior of orangutans who have lived closely with humans, but much about human behavior also. For the habits and even the personalities of captured orangs are shaped by the attitudes and treatment of the humans they have lived with, just as a child's behavior is fundamentally influenced by its parents.

Winnie, for example, was a sub-adult who had been taught to smoke; she watched the staff slyly and when she saw them smoking often threw herself at them, grappling with them and snatching their cigarettes. Arthur brought his violent background into Sepilok, breaking into the halting bungalow in a fit of destruction and attacking the rangers. Henry had come from a timber camp where he had been taught to go through obscene pantomimes to amuse the woodcutters.

But of all the orangutans brought to Sepilok, Joan, my first acquaintance, has provided the richest material for behavioral study. More is known of her background, she has been there longest, she has had two babies while at the center and, as one of the rangers put it, she is still "hanging around."

That morning when I first met Joan and Johnnie and she looked me over so carefully, I had the feeling that we were establishing a rapport for the days we would share in the forest. In my treks through the jungle I was accompanied by Sundang Sarim, a young ranger who knew the forest well. And every day, sooner or later, we found Joan.

Sarim was particularly fond of Joan and he could find her in the forest even during her moods of concealment, spotting her in the canopy and calling out in his melodious Malay, "Joan, *makan*! Joan, *makan*!" "Joan, come eat!" And he would hold up the offering of fruit which he carried to tempt her.

Writer-photographer Mydans, once with Life *and now in Singapore for* Time, *appeared in* SMITHSONIAN *(May 1973) with pictures of Lake Mascoma, N.H.*

Orangutans do not all look alike. Wallace, above, is a light tan around the eyes and mouth . . .

. . . while Joan, below with her baby, is darker. The author quickly learned to recognize individuals.

In the end she would come, always taking her own good time. But when she reached us she would take the fruit at once. Sometimes she sat right there and ate it, with Johnnie putting out his little black hand in a begging gesture and getting bits and pieces of the fruit. But more often she took the fruit in her hand or foot, and, climbing to a branch not high above us, would squat there eating it, letting the rinds and skins drop in little showers.

Often we followed her for hours, and when she came down to the lower branches, I worked so close to her with my cameras that sometimes when she unpredictably changed course, as she swung from vine to vine, we had to dodge each other to avoid collision. Once, when I was absorbed with my camera to my eye, the vine she was swinging on carried her past me like a pendulum and she reached out and gently tapped me on the head, as a child on a swing might touch the head of a playmate standing nearby.

Each day she seemed to get busier and busier, mov-

ing branches and dead logs around and performing all kinds of nonsensical acts, and I saw with astonishment that she was wearing that transparent expression of make-believe preoccupation that self-conscious people put on for the camera. She seemed very human to me, and I felt that we had reached a relationship between photographer and subject that photographers know is common in the world of people.

Thus I was unprepared for Joan's attack, especially unprepared that her rage should be directed at her friend, the ranger Sarim. That morning she had come out of her night's nest and climbed down directly to me. Sarim had bananas and was offering them to her, a couple at a time. She sat there eating them and her mouth was full and white with fruit, when suddenly she threw herself at Sarim in a flying tackle, grabbing his legs and hurling him to the ground with a thud. She bit his leg viciously and Sarim screamed at her to stop. "Her strength was so fierce," he told me later, "that it was more frightening than the biting. I was helpless, and I was scared."

I pounded Joan on the back with my fists, avoiding little Johnnie who was clinging there, his head hidden in her fur. Then Joan let go and ran away a few steps and sat erect and watched us. I took Sarim out of the forest as quickly as I could and to the hospital.

Next morning Sarim was back at the halting bungalow, but he limped on his bound leg and showed no heart to go back into the jungle. The experience had clearly left its mark and I felt it might have an influence on his career. So I urged him to go back in there with me and after a while he took some bananas and we went off again down the dark rain-forest pathway, Sarim leading, limping warily along.

We walked quietly until he stopped abruptly, listening, his head turned up. "Joan," he said to me in a low voice. "Joan's up there." Now I heard the breaking of branches, and following Sarim's glance I saw leaves falling. Then I saw a tiny patch of red far up in the forest canopy. For a moment Sarim stood looking up. Then he called, "Joan, *makan*! Joan, *makan*!" There was a long and nervous wait. Then we could see the red patch moving down toward us.

"Joan, *makan*!" he called again, holding the bananas up as he always did. This time Joan came down directly, moving fast, and as she hung just above us on a trellis of vines, Sarim backed away.

There was a soft, inquiring look on her leathery face. Johnnie had one of her enormous calloused hands in his tiny black ones, and with the other she reached out toward Sarim. Was it a gesture of friendship? Sarim stepped up and gave her the bananas. She took them and transferred them to her foot and slipped the ripe fruit out of their skins one by one and ate them, poking little pieces into Johnnie's mouth. Then she climbed to a branch overhead and began to fold small branches under her to build a nest.

"She's going to sleep now," Sarim said. "We'll come back tomorrow and take more pictures."

As I looked back I saw her crouched on her leafy bed with little Johnnie clutching the fur of her chest. She was looking after us as though we puzzled her just as she, in her inexplicable behavior, had puzzled us.

Would a wild orangutan have made such an unprovoked attack? Studies of other apes in the wild indicate that although they may make frightening threat-displays—snatching up branches, bellowing, stamping the ground or beating on their chests—they are reluctant to attack. Although so little has yet been done in the observation of wild orangutans, it would seem likely that Joan's irrational behavior was a reflection of her life among human beings rather than of the orangutan's natural character.

So it also would seem reasonable to hope that when Joan's little Johnnie—and the offspring of the other rehabilitated orangutans—grows up alone beneath the shelter of the saraya canopy, among the palms and ironwoods and bamboo thickets of his natural home, he will do no more than move off shyly, hiding himself at the approach of humans, watching them from a safe perch. And if this happens, the chances of any human having the experiences I had among the orangutans at Sepilok will have ended. He will be lucky to catch a glimpse of one of these wary animals that have so attracted humans with strange reflections of themselves and echoes of something vaguely familiar, from a long time ago.

If the Borneo scheme succeeds, young orangutans like Johnnie will never come this close to humans again.

Cutaway model of Lindbergh's *Spirit of St. Louis* is displayed under the real thing at the Smithsonian.

Photographs by Lee Boltin

Consolidated NY-2 of 1929, tiny propeller spinning as though for takeoff, recalls first instrument flight.

By Keith Wheeler

Wooing world's prettiest models– aircraft, that is

These Smithsonian planes are not toys at all. Nearly perfect in their jewel-like detail, they record Man's romance with aviation

Above my typewriter, so placed that it collides with my skull if I stand up without forethought, hangs a four-foot model of a World War II training biplane, the Boeing PT-17. Off to the left, where it can hit me any time I leave my office, hangs a six-foot model of the same war's renowned fighter plane, the North American P-51 Mustang. Exiled to the garage, because the office affords no more room, hangs a five-foot replica of a modern light aircraft, the Cessna 182 Skylane.

These are flying models, controlled from the ground by sophisticated radio transmitters. To adjust the throttle, elevator, rudder or ailerons of a radio-controlled model while it is in flight, I move two small "sticks" on the transmitter box in my hands.

Undersized aircraft such as mine are flown for fun or in competition by at least 100,000 underage adults in this country and perhaps another 250,000 elsewhere. This fraternity describes airplanes like mine as being of "standoff scale." This means that if one stands off at a forgiving distance, they closely resemble the grown-up aircraft that inspired them.

They are not built to precise scale for several reasons, the first of which, admittedly, is a shortfall of skill. Also, aerodynamic forces exerted on miniature flying machines differ in a small but important degree from those affecting full-sized aircraft. A flying model needs a longer nose or tail extending farther beyond the center of gravity, an increased fin or fuselage profile area and more dihedral. These changes in scale tend to compensate the ground-bound pilot for his lack of any feel for his machine, except what he gains through his eyesight.

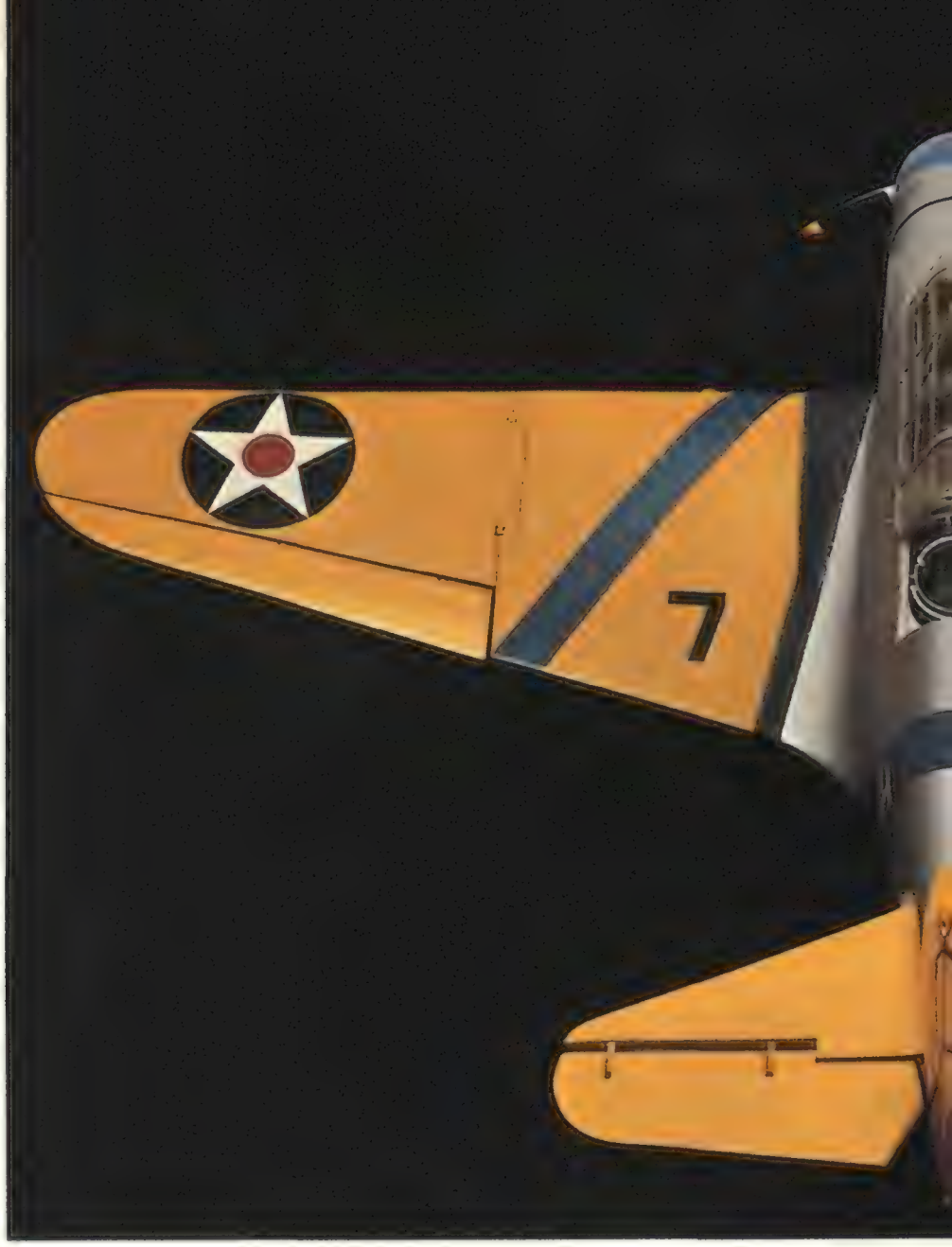
The fellow who builds and flies miniature aircraft knows "exact scale won't fly," but out of an instinctive yearning for verisimilitude, he copies the real thing as closely as he hopes will work. He wants his damn contraption to get up in the sky and *act* like man in flight, but when he gets it down in one piece, he wants it to *look* as though Louis Blériot or General Jimmy

As well as being an aviation buff, Keith Wheeler is a former Life *writer and author of seven books. Lee Boltin's photographs often appear in* SMITHSONIAN.

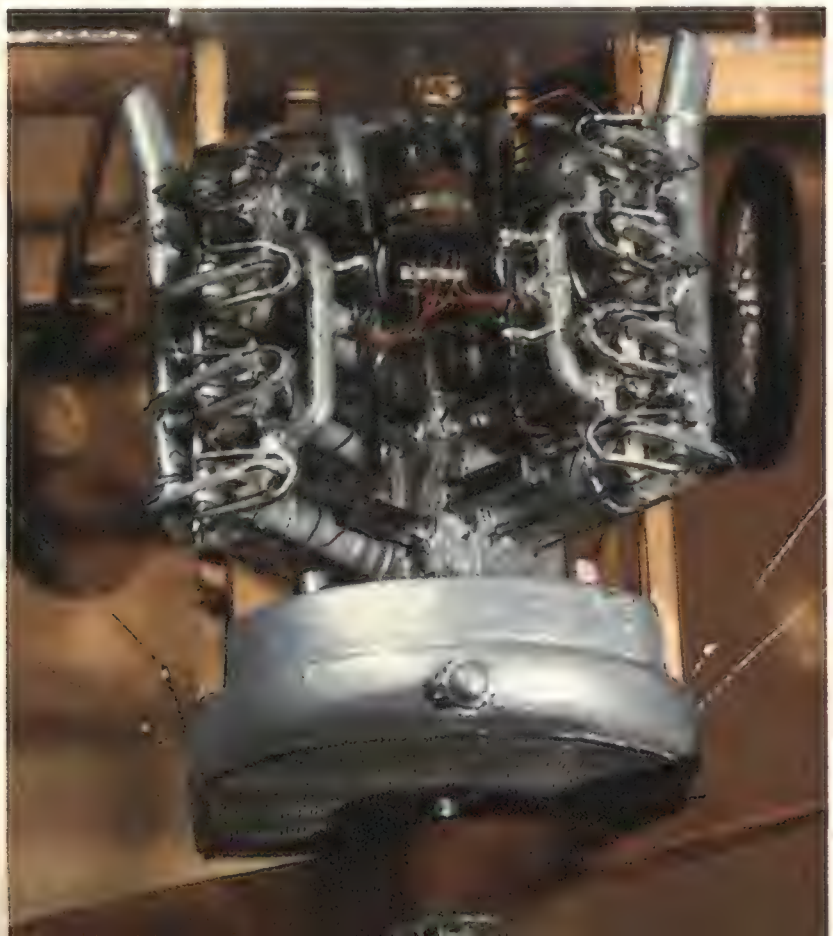
Smithsonian's model aircraft

Doolittle, if reincarnated at about the size of Barbie Doll's boy friend Ken, might have been at the controls.

I speak of these impedimenta in my home—and their shortcomings—by way of qualification to admire one of the finest collections of *exact*-scale models of historical aircraft anywhere in the world. These superb specimens are housed in two old buildings of the Smithsonian, the turreted 1879 Arts and Industries Building and an incongruous but possibly fitting leftover World War I prefab airplane hanger called the Air and Space Building. As well as models, of course, these hold some famous actual aircraft that will eventually go into the Smithsonian's vast new Air and Space Museum, now



In miniature, Curtiss "Jenny" (right) has skeleton bared. Rocker arms of the two-inch long OX-5 engine move up and down as propeller turns (below).



Douglas TBD, the torpedo bomber with which the Navy entered World War II, appears here so perfectly miniaturized that its controls (above) actually work.

being built. More models—a spillover of miniaturized footnotes to the history of flight—lie binned and stacked in a dusty Washington warehouse because, as is the case in my office, there is no other room for them.

Each of the Smithsonian models—and they run to several hundred—stands for some significant or famous feat or technological leap forward in the brief 70 years of powered human flight, or for some brave, futile attempt at it dating back to Leonardo da Vinci. Any one of them furnishes a good visual representation of the original. Those shown on these pages are among the best of them, achieving a degree of excellence which Louis Casey, curator of the collection, is willing to describe as "museum quality." This can best be defined as precision engineering distilled into fine art. To achieve it, a model must have detailed authenticity—everything in place, everything in proportion, and all adding up to the same clarity of line and purpose as the works of a fine Swiss watch. The best of the Smithsonian's flying-machine models have no superiors and their only acknowledged equals are treasured by the Musée de l'Air near Paris.

One of the Smithsonian's best is a handsomely crafted miniature of the Consolidated NY-2 biplane in which, in 1929, Jimmy Doolittle successfully performed aviation's first totally blind landing, under a hood and guided only by his instruments. This miniature (see p. 35) was built by Robert Mikesh, now a member of the Smithsonian Air and Space curatorial staff, who flew in combat during both the Korean War and the war in Vietnam.

Mikesh probably is as good an example of a creator of museum-quality model aircraft as one is likely to find. He began building rubber-band-powered models when he was nine, gradually focused on detailed, true-scale miniatures, joined the Air Force to get into the steady company of planes and, eventually, the Smithsonian to continue the association.

The Institution commissioned him to build the NY-2 in 1962 for $400, which does not seem an extravagant return for 400 hours of painstaking effort. Much of this time went into fabrication of the nine-cylinder J-5 radial engine with its air-cooled cylinders built up of myriad, different-sized cuttings of thin celluloid and the fashioning of true-scale turnbuckles for the plane's complex triangulation of flying—and landing—wire rigging. Put to the task of defining that elusive term "museum quality," Mikesh frowns in thought and finally says, "I suppose it's the lack of distracting details which keep you from feeling you're looking at the real thing."

The first of the real things took the air on December 17, 1903, at Kill Devil Hills near Kitty Hawk, North Carolina. The Wright brothers' "Flyer," a biplane contraption with Orville aboard, flew 12 seconds and about 100 feet, and so introduced manned flight to the world.

The Wrights were not model builders. Their line of experimentation had been with kites, gliders and a pioneer wind tunnel. And when they did get there at last at Kitty Hawk, they were poverty-stricken indeed when it came to power. Their home-built gasoline engine weighed 180 pounds and produced only 12 horsepower. I find myself in a sympathetic frame of mind when I reflect that with the baby aircraft engines around my house I could have lent them the same amount of power at a weight cost of not much more than 180 ounces.

The Wright brothers' planes—engine-driven or not—looked like what they essentially were, frail and droopy boxkites where one brother could lie flat on his belly in the middle of the wing. The Smithsonian displays a dozen or more models of early Wright aircraft. These include the first military airplane, sold to the War Department for $25,000 in 1909 because it could get up to 42.58 mph, and the first transcontinental airplane, a 1911 Wright EX, which used up 84 days and 70 landings to get from Sheepshead Bay, Long Island, to Long Beach, California. It arrived

Stark wooden model of the NC-4 was especially made for wind-tunnel tests. The actual flying boat, with its 126-foot wingspan, was the first to cross the Atlantic, making it in four hops in 1919.

with its pilot on crutches and with only one strut and the rudder remaining of the components with which it began. All these models are of superior quality and most are behind one glass wall in the present Air and Space Building.

Curiously, the finest and most significant of these miniatures has never been publicly displayed. The Institution feels less than compelled to exhibit the model of the original Wright "Flyer" since the plane itself—the patriarch of the whole family of flight—hangs in full view, next to the original *Spirit of St. Louis,* in the old Arts and Industries Building (SMITHSONIAN, June 1970).

The actual Wright planes, of course, were very frail, and their diminutives are frailer still. Lew Casey, subscribing to an old museum axiom that "if you move something three times you can throw it away," is reluctant to make many changes with these models at least until the new building is completed.

Best models are of early planes

Contrived in an age when slicker materials and power still awaited invention, the Wright machines represented an apotheosis of the stick, wire and cloth school of aircraft construction. They were also puritanically sparse constructions, as well they had to be. But their breed held on for at least 30 years and, as they grew in sophistication, stick and wire construction became amazingly complex. For this reason, airplanes built up to say 1930 generally make for better models than anything that came later.

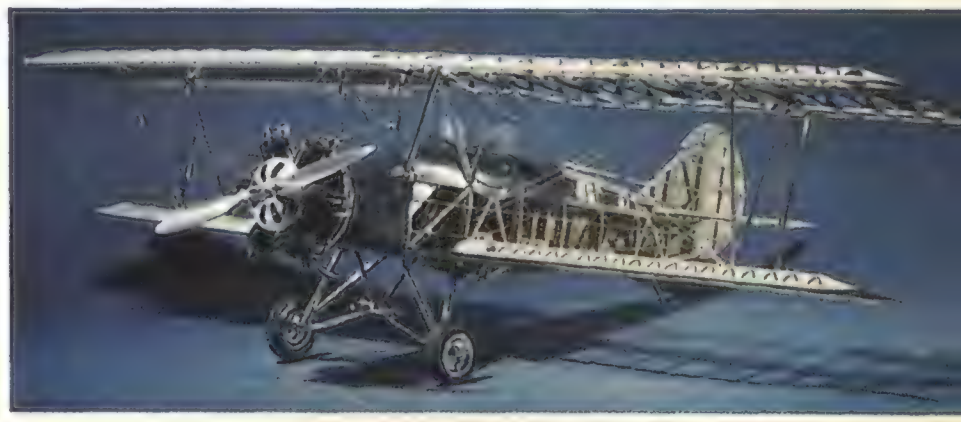
It is perfectly possible to create an accurate scale model of an XB-70 trisonic experimental bomber by pouring it into a plastic mold; the trouble is that the result still looks like plastic when it emerges. Not so with the old-timers. To reproduce them in authentic miniature exacts a price in skill and devotion that runs into hundreds of hours. No craftsman ever realized even the legal minimum wage constructing such treasures. His compensation must come largely in the coin of love.

Aircraft construction was still simple when Glenn Curtiss developed his pusher (propeller mounted behind the wings) biplanes in 1909. But there were advances. Curtiss used hinged ailerons instead of warping the wings as the Wrights had done to bank around corners. One of the fine models in the Institution is Curtiss' A-1 hydroplane, which became the U.S. Navy's very first air arm.

Coming near the last of stick and wire construction, Lindbergh's *Spirit of St. Louis,* built in 1927, used welded steel tubing to replace some of the sticks. A remarkable exhibit among the Smithsonian's models is a miniature of Lindbergh's plane in a glass case just

Glenn Curtiss' "AEA June Bug," modeled here, won the *Scientific American* Trophy of 1908.

Model of Curtiss' first Navy plane recalls original that took off from San Diego Harbor in 1911.



Cutaway of Travel Air biplane of the 1920s is fitted with tiny radial engine instead of usual OX-5.

Our first Navy fighter, born in early Twenties, was this Curtiss H-A two-seater. Model shows its gun ring.

beneath where the original hangs in the rotunda (p. 34). The model is half-covered, half-skeletonized, thus revealing accurately its intricate innards.

The entire front section of the fuselage was filled with tanks for 451 gallons of gasoline and 20 gallons of oil. Lindbergh flew from Long Island to Paris virtually blind, except for a periscope mounted above his larder of ham sandwiches.

Lindbergh's accomplishment was so lonesomely dramatic that it all but obliterated the memory that men had flown the Atlantic before him—although, of course, not alone and not in a single jump. But the event—the four-jump flight of the outsized flying boat NC-4 from Rockaway, Long Island, to Lisbon in 1919—has its memorial among the Smithsonian's models (p. 38). The miniature of the big boat serves also to demonstrate that scale models have practical uses in addition to being something to look at and marvel over. The model, its boat hull a solid slab of polished mahogany, was built to analyze the design in a wind tunnel even before the first of four full-sized aircraft were built for the intercontinental flight.

The collection includes one other working model—a painstakingly accurate diminutive of a World War II medium bomber, the famous B-25 (pp. 40, 41). It carries, mounted inverted in the wing nacelles, two real engines—like mine, one-cylinder semidiesels which burn an exotic compound of castor oil, methyl alcohol and explosive nitro methane. This model, almost precisely faithful to the original, is capable of being flown—not, however, by remote radio control. This is what the model cult calls a "ukie" or control-line craft which flies on a tether with its operator spinning around in circles more or less like a dervish in his transports. Because the pilot keeps direct physical contact with the thing, it could be built nearer to precise scale than is possible with a radio-directed craft.

Moved both by excellence and personal nostalgia, I have chosen two exquisite Smithsonian models for the bulk of my affection. Both are of the stick and wire school and both are half-covered, half-skeleton.

One is the only really famous airplane manufactured by the United States in World War I, the JN-4D biplane training plane which hundreds of earnest neophytes stood on its nose on Texas training fields and in which hundreds more barnstormed the country after the armistice, carrying the rubes from one potato field to the next at $5 a head for five minutes aloft.

This famous old Curtiss "Jenny" was not only handsome; it was also lugged around by an OX-5, an eight-cylinder, 90-horsepower water-cooled engine so firmly held in the affection of all-time aviators that they keep a distinguished club alive in its name. Even the rocker arms work on this Jenny's engine (pp. 36, 37).

The OX-5 engine furnished the modest power available for many of the airplanes flying in America after World War I. It was frequently installed, for example, in such aircraft as the Travel Air biplane of the late Twenties. The Smithsonian's model of this plane, mounting one of the earliest air-cooled radial engines instead of an OX-5, is exquisitely engineered out of hundreds of bits of spruce, piano wire, jewel-like metal parts and fine linen. Probably its only goof—and that one somehow endearing—is that the builder, for some reason used a pair of full-scale pinking shears to cut the tapes that bind the fabric to the wings.

I, for one, forgive him fully. It was in just such a Travel Air, mounting an OX-5, that I learned to fly an honest-to-God, full-sized airplane 45 years ago. And that time span, I am shocked to realize, was just about two-thirds of all the way back to the Wright brothers "Flyer" and the very beginning—exactly 70 years ago next month.

B-25, workhorse medium bomber of World War II, rings true from oil stains and muzzle blast scars to swinging top turret (right). But its wingtip wires give it away: It's a control-line flying model.

By Piri Halasz

He brightens up the spectrum of contemporary art

Ellsworth Kelly is recognized in a glowing exhibition of color-filled paintings and sculpture at the Museum of Modern Art

In 1949, a tall, skinny young man from New Jersey named Ellsworth Kelly paid a call on the Musée d'Art Moderne in Paris. He was studying art and had come to see the paintings on view. Instead, he found himself gazing in admiration at the tall, gracefully narrow windows of the exhibition hall.

"All of a sudden," he recalls, "I stood back, and what was on the walls seemed so paltry compared to those great windows. I made a sketch of one and came back to my studio and did the window." More precisely, he put together two rectangles of canvas, one painted white and one gray, to suggest the window's upper and lower halves. Then he added black strips of wood to represent the pane divisions and frame.

Painting? Sculpture? Technically, the finished work might have been called a relief, but it didn't look like the literal representation of a window. Reduced to its bare essentials, the form evolved instead into a singularly pure, clear, simple composition, tantalizing in its associations with the visible world but elevated to the level of an abstract statement about good design.

Symbolically and literally, that window opened onto new horizons for Ellsworth Kelly. From that day forward, he found that he had acquired a whole new way of looking at the world and translating its images into three-dimensional objects or heraldic designs. Kelly is known for large, spare shapes—a flaring arrow (p. 49), a biomorphic bulge that occupies an entire panel or a prismatic row of vertical slats of color (above). His colors are elemental, vivid, frequently only two to a canvas, while an entire sculpture may be painted a solid, eye-shattering blue.

Critics call these works what they will. Sometimes the finished pieces are two-dimensional and, therefore, paintings; or they are free-standing and, therefore, sculptures. Together, they share a mysterious, organic quality of being not reproductions of reality but new, condensed and etherealized forms of reality itself.

"I've always felt competitive with reality," the artist explains. "If you could become objective about everything around you, if you could lay aside the fact that you're a human being with all your knowledge and just use your eyes, if you could try to think of yourself

Piri Halasz is a New York free-lance writer on cultural subjects. She is a former art writer for Time *and appeared recently in* Art News.

In wide-angle view of the Kelly show, *Blue Red Rocker,* a painted aluminum sculpture of 1963, rests on the floor in front of *Spectrum, IV,* a painting made up

of monochrome panels, joined together. The four panels on the wall to the right are a single work, titled—obviously—*Green Red Yellow Blue.*

as just born or from another planet and try to understand things from a purely visual point of view—then everything is fantastic. Everything has infinite possibilities. Anything goes, and what you see can be used."

Because he sees things so totally from "a visual point of view," the objects Kelly seizes upon as subjects for paintings are things ordinary mortals tend to overlook. He has been turned on by no more than the shadows cast by telephone lines on a wall, by the piping on a sneaker, by the curve of two apples touching, by a row of windows or a row of doors.

"I've always been interested in fragmentation," he explains, "in apertures, doors and windows. When you look through them, that fragmented view changes as you move, and you get a series of different pictures." Thus each of Kelly's works is, in effect, a fragment of reality seen through the portal of a picture's perimeter. The telephone lines become stark bands of black on a pennant-shaped white ground; the sneaker piping, two arches of white on a dark-blue field. The apples metamorphose into a great pair of hemispheres, pressing inward toward each other on a narrow, vertical canvas. The rows of windows and doors have been developed by the artist, many times, into series of panels painted in a blazing spectrum.

The forms that catch Kelly's eye may, in nature, be colored drab gray or olive, but when he transposes them to paintings, he emphasizes their appeal by giving them bold, voluptuous hues. He chooses each color because it seems intuitively "right" to him.

The rightness of his esthetic decisions can be attested to by the growing measure of recognition Kelly has received in recent years. This autumn it is reaching a new crest. Kelly is being awarded the honor of a retro-

Blue Curve, V, a rhomboidal canvas about 9 feet high, is diagonally bisected by a compass-drawn arc.

Courtesy Leo Castelli Gallery, New York

spective exhibition at Manhattan's Museum of Modern Art, with 52 paintings and sculptures and 24 drawings and collages, tracing his development from 1949 to the present. The Kelly show will travel to the Pasadena Museum of Modern Art, the Walker Art Center in Minneapolis and the Detroit Institute of Arts.

Simultaneously, two books about the artist have been published. One, the catalog of the exhibition, is a critical biography by Eugene C. Goossen, Professor of Art at Manhattan's Hunter College. The other is by John Coplans, editor of *Artforum* magazine.

To Coplans, Ellsworth Kelly is "perhaps one of the most enigmatic and unique forces in contemporary American art. [He is] increasingly acknowledged as an artist of outstanding quality and a radical innovator." While Goossen's biography does not deal in comparisons and superlatives, the author, in conversation, ranks Kelly "in terms of quality" with the greatest painters of the school of abstract expressionism that flourished in New York in the Forties and Fifties—including Jackson Pollock. "Kelly has certainly carved out a place for himself equal to that of any of the first generation of the New York school," Goossen says with cool conviction.

Although some viewers still find Kelly's work baffling, obscure and difficult to appreciate, Goossen argues that he is "one of the most open of artists." In some ways, Goossen allows, "he's almost too easy to take. He's open in the sense that he appeals directly to one's senses. I don't think he wants people to cerebrate about what he does."

Collection of the artist

Avocado is one of many finely observed line drawings of plants that Kelly continues to make.

He defies categories and labels

Kelly's work, of course, has been known and admired for some time. As early as 1959 he was included in the Modern's group exhibition of "Sixteen Americans," which also introduced to a wider public two other comers, Robert Rauschenberg and Jasper Johns. Kelly was one of four artists chosen to represent the United States in the 1966 Venice Biennale. His paintings and drawings received extensive exhibition space in the Metropolitan Museum's ambitious 1969 survey of postwar New York art, and many museums and private collectors own his work.

Even though Kelly has always seemed too significant an artist to leave out of major exhibitions, his work defies categories and labels. Because it doesn't seem to typify or epitomize any particular movement in art, he has escaped the limelight—until now.

Kelly himself has never been an art world celebrity like, for example, Alexander Calder. A shy bachelor of 50, he has lived for the past four years in a secluded, Colonial-style house in the hamlet of Spencertown, New York, near Albany. His sole companions are a cat

Kelly, often considered difficult and camera-shy, had no difficulty in striking this cheerful attitude.

named Puss, a dog named Pups, a collection of his art and a carefully tended sun porch full of plants.

Why should 1973 be the year in which a wider audience at last "discovers" Ellsworth Kelly? The answers may be found both in his own work and in the state of the contemporary art scene.

When Kelly first returned to New York from Paris in 1954, his work was looked upon as something of a curiosity. The fashion of the day was abstraction, but not Kelly's kind. Pollock and Willem de Kooning had set the style for extravagantly expressionist canvases, with paint slathered on in an energetic, highly gestural manner.

A number of younger painters, then as now, inhabited lofts in lower Manhattan; Kelly took one, too. But most of the other artists were doggedly imitating the lush, showy brushwork of de Kooning. By contrast, Kelly, in his first gallery exhibitions, showed crisp, geometric checkerboards with squares of many colors. He displayed series of colored panels, executed with the same cool, almost mechanical precision, and large canvases emblazoned with cleanly delineated areas of flat, unmodulated color.

In the late 1950s, Kelly began making large, free-standing sculpture, composed of two or three planes of painted aluminum, bolted together at right angles or aligned at a gentler tilt. Once again, his sources for each piece are in the real world, yet the finished work appears totally abstract because Kelly neither wants nor allows his tie line to reality to be obvious.

But Kelly's work was too singular to be fully appreciated. Having been eclipsed by abstract expressionism, it was nearly lost in the shuffle of the early 1960s, which witnessed the flowering of that many-splendored artistic and sociological phenomenon known as pop art. The public appetite was more naturally whetted by the fact that Roy Lichtenstein was showing heroes who looked like Flash Gordon—complete with speech balloons. People discussed with bemused fascination the social significance of Andy Warhol's soup cans. Television specials were revved up after Claes Oldenburg made a giant soft hamburger and Robert Rauschenberg won a prize at the Venice Biennale with such antics as a stuffed angora goat with a tire around its ribs.

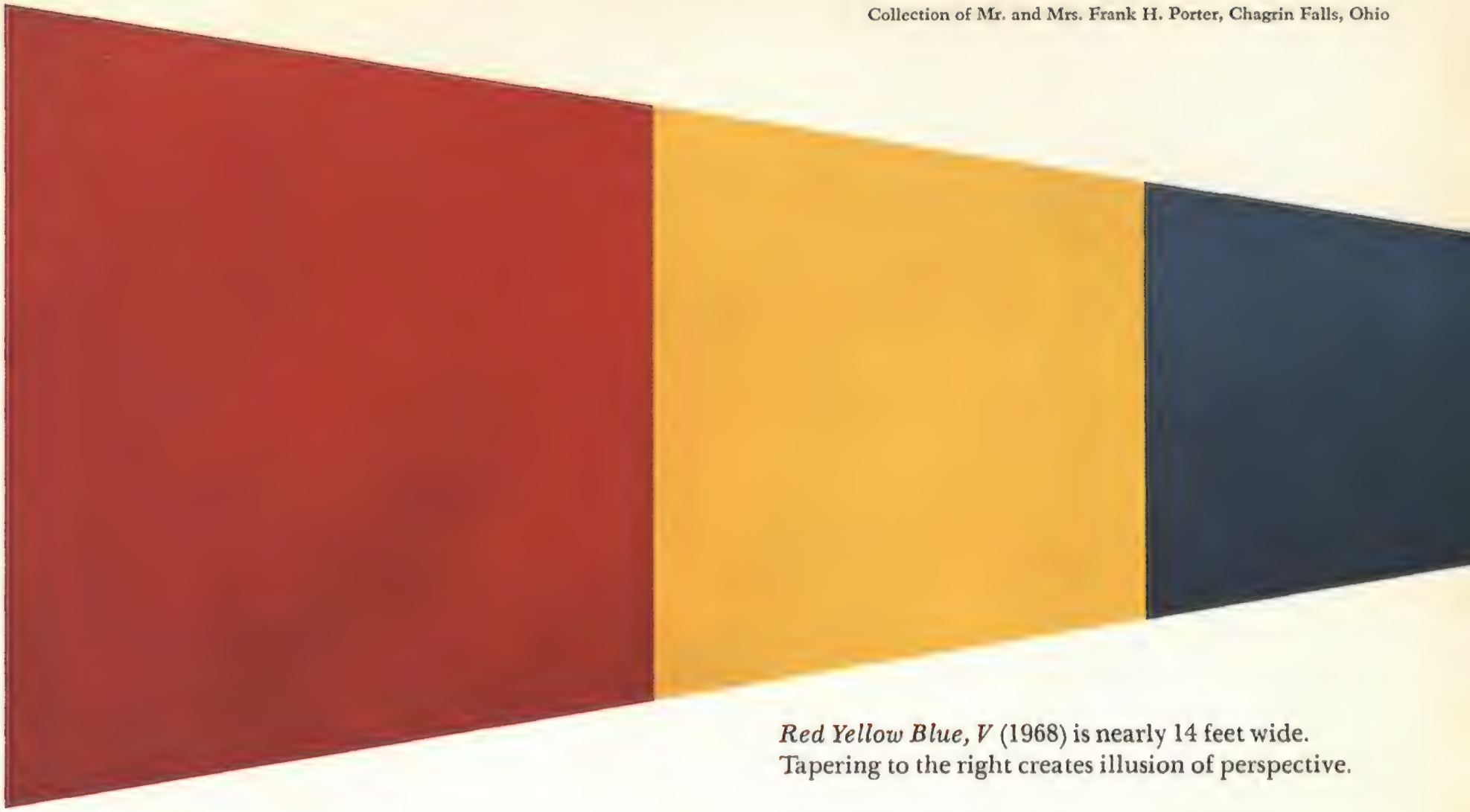
In the midst of the whoop-de-do, few observers had much time (or inclination) to think about abstract painting such as Kelly's. But by the mid-1960s pop art began to fizzle. Warhol concentrated on films and Rauschenberg devoted his energies to avant-garde dance projects. Then a new generation of artists came along who were making "minimal" sculptures—large, simple cubes and boxes of metal or plastic. Although Kelly anticipated the new style and was, in fact, included in shows of minimal art, his work still appeared out of kilter—it now looked too organic, overly colorful and much too "interesting."

But having survived the turbulent, stylistic cross-currents of the 1960s, Ellsworth Kelly's work is at last being reassessed. Aided by the perspective of time, he is beginning to be appreciated not only as a trailblazer of recent "color painting" but as a pioneer of minimal sculpture as well. Because so many of his principles and ideas have been picked up and further explored by artists who came after him, he now seems a central figure in the history of artistic developments, rather than a peripheral one.

Like most abstractionists, Kelly did not set out to be one. As the son of an insurance company executive, growing up in suburban New Jersey, Kelly knew only that his public school art classes were among the rela-

Collection of the artist

Kelly joined two panels for stark relationship in *Black Square with Red* (1970), about 7½-feet wide.



Collection of Mr. and Mrs. Frank H. Porter, Chagrin Falls, Ohio

Red Yellow Blue, V (1968) is nearly 14 feet wide. Tapering to the right creates illusion of perspective.

tively enjoyable aspects of an essentially unhappy and lonely childhood.

"Most of my childhood," he reminisces, "was something to be got out of." He had a bad stammer, which made it hard to make friends, and was a sickly child, forbidden vigorous athletics. His only hobby was bird watching. (Some go so far as to claim a connection between Kelly's two- and three-color paintings and his fascination with two- and three-color birds.) To this day, he can identify a killdeer by its call or spot a particular variety of warbler 50 yards away.

Kelly attended a commercial art school in Brooklyn for more than a year before volunteering and being inducted into the Army in 1943. Because of his art-school background, he was assigned to a camouflage battalion. There, for the first time, he realized that "I didn't want to make any kind of art that would serve anybody but myself."

On leave in England and France, Kelly visited stately Elizabethan homes and Norman churches. The solidity and craftsmanship of these ancient buildings struck a profoundly responsive chord. Kelly sketched them. After the war, he studied under the G.I. Bill at the School of the Museum of Fine Arts in Boston. However, the lure of Paris, still believed by many people to be the art capital of the world since the days of the Impressionists, was too strong. In 1948, he transferred to the École des Beaux-Arts.

In a private library he examined a study collection of Russian and Greek icons and was impressed by the frontality and flatness of their Byzantine style. He bicycled all over France to visit Romanesque churches. The calmness, the simplicity, the stylization of these early Christian works held a great attraction for him. He was able to visit Alice B. Toklas, the longtime companion of the late Gertrude Stein, and see the famous collection of Picassos and Matisses that Miss Stein had assembled. He managed to win introductions to Constantin Brancusi, the sculptor, and Jean Arp, whose Dadaist sculptures and reliefs cast new light on techniques for him.

He took snapshots and drew sketches of chimneys against old houses, of indented lines on concrete walls, of Parisian bus-stop signs. Absorbed, he watched French stonemasons, lineal descendants of the medieval guild members who had built the cathedrals, at work. Visiting friends at their country homes, Kelly studied and analyzed the forms of roadside kilometer markers, doors and windows, the shadows cast by trees.

He made portraits of friends and drawings of plants, but when it came to executing the sketches as paintings, he found that conventional subjects, such as plants and people, led to conventional paintings, overly indebted to the styles of Picasso and Klee.

"I'd seen their paintings," he says, "and they seemed like a very complete statement. There was nothing else to do with it. The idea of following along was just too boring."

The walls, the chimneys, the shadows—these, on the other hand, could be used for paintings once Kelly had achieved his breakthrough with the Paris museum window. He experimented, too, with other ways of making pictures, organizing his brilliant checkerboards by a random method. He marked bits of paper with numbers corresponding to colors, then arranged the colors on his canvas according to the chance order in which they fell.

The idea was not exactly revolutionary. The Dadaists, most notably Arp, had invented the idea of using chance to organize a picture during and after World War I. But for Kelly it was yet another way of breaking loose from established means of composition. He wanted to create a new style, a personal style with no intellectual overtones, fresh and immediate, not logically "composed."

Kelly supported himself with odd jobs for several years after his G.I. Bill benefits ran out. He returned to America because he felt that "to make it as a painter, I had to do it in my own country."

Kelly is concerned about the way in which modern art is related to present-day society in America—or rather, by the fact that it is not related as much as he believes it ought to be.

"Art today," he observes, "is not being used the way medieval art was used. I guess Impressionist art is used, but modern art—the people up here, around where I live, they're against it. Art is a luxury today. It's hung on a wall, and people go to a museum and throw up their hands and say, we can't *use* it."

How would Kelly like his art to be "used"?

"I'd like the paintings I do to be a source of stabilizing things. I'd like New York to look different, to be different. New York is a hellhole these days, and America looks awful. Artists are almost the only people handing down something from the guilds; they're the only people working for clarity. Like the members of the guilds, they're trying to satisfy themselves, to make a present to the world.

"A good piece of art is permanent. That is why it can always be used. I feel that if you put a painting of mine in a room, and live with it for a while, it can help you. It's a statement, the way it is: This is as far as I can make it to perfection."

Kelly's art, in other words, is essentially classic as opposed to romantic—an art of the ideal, despite its roots in the real. He is concerned with the perception, the expression and the affirmation of abstract beauty, wherever it exists in nature or man's handiwork. Inspired by a Kelly, an individual may be better equipped to discern and select the finer elements in his polyglot environment—from insisting upon a car with better design and workmanship to, by inference, reordering his basic priorities. If such insistence upon ideals, upon perfection, helps to make Kelly's art demanding and difficult, that is perhaps only a reflection of the way in which passionate idealism itself so often appears to the workaday world.

The Museum of Modern Art, New York

Green Blue, a 1968 sculpture of painted aluminum, is a rhomboid that was bent into triangular planes.

Blue Green, a 1962 canvas more than 7 feet high, features a fat and deliberately asymmetrical arrow.

Collection of the artist

By Frank O. Braynard

A movable feast aboard *Leviathan*, our prize of war

Interned in 1914 as Vaterland, *queen liner of imperial Germany, she transported doughboys, then hosted the rich who made the '20s roar*

Can you love a ship as though she were alive? Certainly. *Leviathan,* for years "the world's greatest ship," had a human personality, and though she has been scrapped these 35 years, I love her still.

My love for this great liner began when she was in her glory in 1923—ten years after her launching. She was then commencing her role as a floating palace for film stars and the gilded rich of the Twenties—America's great transatlantic passenger ship.

She started life, of course, as the pride of imperial Germany. Christened *Vaterland,* she slipped down the ways at Hamburg on April 3, 1913, 54,300 tons, 950 feet from stem to stern, fitted with every luxury, able to carry 4,050 passengers. Sixteen months later, when World War I broke out, the huge vessel was interned at Hoboken and became headquarters for German activity in an America that was uncertain which side it would take, if any, in a conflict that seemed restricted to Europe. Hoboken was almost a German colony and *Vaterland* echoed to fund-raising dances for German relief. Prominent Americans attended, including arch-anglophobe William Randolph Hearst.

These galas continued even after the Germans sank Great Britain's *Lusitania* with the loss of many Americans. The last of the balls had a dreamlike quality: the ship brilliantly lit, the pier gaily decorated, the guests in evening dress, whisked to the flag-decked gangplank in trolleys as they clutched their $10 tickets. Dinner was in the grand saloon.

Well-heeled burghers of the Kaiser's Germany take a little sun in *Vaterland's* first-class section,

The starboard promenade deck was filled with flowers and bunting and the soft music of the harp. In case anyone missed the point, it was labeled "IN HEAVEN." From there, guests were directed to the portside promenade where the decor suggested the infernal regions, and waiters costumed as imps staggered under trayfuls of drinks.

Vaterland's German career ended for good on an April morning in 1917. With the United States only hours away from declaring war on Germany, the vessel was seized for the Treasury Department. She made the headlines with stories of how she had been sabotaged, though this did not happen to any great extent. Many of her crew, in fact, became American citizens.

But soon began one of the most gigantic rapes ever perpetrated—the theft of thousands of costly fittings, table linen and silver plate from the Imperial Suite. The ship had been a veritable museum, her rich adornments including a dozen priceless oil paintings. One huge one was reported to have been hung in a New

South Street Seaport Museum has published the first of Mr. Braynard's four volumes about Leviathan.

on a 1914 voyage. Soon after, the great liner was interned—only 16 months after her launching.

York hotel, but it was never found and a recent check uncovered no record of it.

Controversy developed over what should be done with a vessel five times the size of the largest American liner. It was decided to make her a troopship, and work began. Fortunately, her turbines were of British design and a representative of the patent holder was in New York. Also, happily, electric welding had been developed. After her idle internment, things began to hum aboard U.S.S. *Vaterland.*

The name bothered people. President Wilson was asked to suggest a new one. He turned the task over to his wife. She gave up in despair. Without hesitation, Wilson said, "Why, that's easy, 'Leviathan': It's in the Bible—monster of the deep."

Leviathan she became, corrupted sometimes to "Levi Nathan" and just "Levi" for short—a nickname still fondly remembered by many of her former soldier-passengers. Her wartime crew of 2,240 was far more than that of any other naval vessel. She transported as many as 14,500 souls at a time. She was attacked by submarines hundreds of times in the imaginations of

Super-idol Rudolph Valentino, with radio operator, dramatizes the liner's change of name and flag.

Exercise was so informal in the ship's gymnasium in 1914 that most gentlemen even removed their coats.

A decade later, leap-frogging stewards and other well-photographed high jinks publicized the new mood.

her passengers and, on several occasions, in actuality.

The great ship with her twin turbines developing 61,000 horsepower burned 1,100 tons of coal a day and had to take on 8,000 tons each time she reached France. Everyone, officers included, took part in the grimy, two-day operation, picking the coal lump by lump from barges, putting it into baskets and hoisting them to the open side ports. Once aboard, a miniature railroad carried the coal to the bunkers.

Most members of the *Leviathan* Veterans Association, which still meets annually, remember things like being in Liverpool dry dock. They couldn't use the ship's toilets and were sent to cold outhouses along the wind-swept dock, miles, it seemed, from their bunks. A slanting trough carried clean water under a row of these facilities and the favorite trick was to drop a match onto a wad of oily rags at the high end and send it floating down the trough under the one-holers, producing a series of whoops and enraged exits.

During her troopship days many future notables sailed on *Leviathan*. One of her quartermasters was Humphrey Bogart. General John Pershing was aboard on her final crossing as a troopship with a young general who had been making a name in various ways, including spit-and-polish: Douglas MacArthur.

Bust of eagle-helmeted Kaiser Wilhelm II stood amid the opulence of the first-class social hall.

America's best-known liner

The ship's homecomings after the armistice were tremendous occasions for celebration and she rapidly became America's most widely known vessel. Yet three years of idleness awaited her and soon took their toll. The only American company that had any experience in transatlantic passenger service was J.P. Morgan's combine, the International Mercantile Marine, so the government shipping board turned *Leviathan* over to them. A brilliant young naval architect, William Francis Gibbs, was assigned to restore her.

Halfway through his reconditioning program, Gibbs announced that the ship would weigh nearly 6,000 tons more than her original 54,000 tons. This made her larger than her sister ship *Bismarck,* which had gone to the British as a war reparation and was acquired by Morgan's British flag subsidiary, the White Star Line.

Plans for her trial voyage became a political issue when it was learned that all 531 Congressmen had been invited. Democrats called it "a million-dollar joyride," and when *Leviathan* reached Boston to pick up her passengers, she was not brought into a pier, but was loaded by tender so that no unfriendly person could get past the shore ticket desks.

Once under way, however, the trial fulfilled all hopes. Young David Sarnoff, pioneer of the radio industry, sent more words from the superbly equipped radio room than had ever been sent from a ship at sea. The vessel averaged slightly over 28 knots for six hours. Since the reigning speed queen, *Mauretania,* had averaged just over 25 on her best run, the press claimed *Leviathan* had broken all records. It was soon realized that she had been helped along by the Gulf Stream to the tune of two to three knots, but the ads touted her as "world's fastest" anyway.

Captain—later Commodore—Herbert Hartley headed *Leviathan's* crew of 1,100. Quality service was most important if the ship's cuisine was to match her appointments, but the lack of trained stewards was a major problem. On the first trip across, headlines shouted British charges that Gibbs had stolen stewards from competing British liners by offering higher wages. Deserters would be prosecuted, the British threatened. Rumors said that 80 percent of the crew would be hauled before the bench. But fewer than half-a-dozen deserters were found and only two of these were ever convicted.

Six months after *Leviathan* had splashed onto the transatlantic scene in mid-1923, she had reached new heights and plumbed new depths. Her speed came close to *Mauretania's* record, but she couldn't break it. She carried good passenger lists, but was never sold out because of her huge, barely used steerage and third-class sections. Prohibition kept her from selling alcoholic beverages aboard and gave her a black eye among the elite. In September 1923 her reverse turbines were damaged, and against Captain Hartley's judgment repairs were put off until her winter lay-up.

Her lack of full reverse power was partly responsible for the disaster that befell her that December in New York. She grounded humiliatingly on Robbins Reef. The hull was damaged, though not as badly as

The Palm Beach Girls, with wailing saxes and derby trumpet mutes, played for the fox-trotters of 1926.

rumor had it. Because he refused to talk to the press, her captain was dubbed "Mud Turtle Hartley," but he survived and became a national institution.

Commodore Hartley came to be known as the marrying skipper; he kept a "marrying rug" in his cabin. One of his weddings—cartoonist Bud Fisher, creator of "Mutt and Jeff," and the Countess of Beaumont—resulted in such short-lived bliss and such a burst of bad publicity for the inevitable divorce that it brought an end to his weddings at sea.

Among *Leviathan's* rich and loyal clientele, anecdotes arose of happenings that brightened her voyages. There was, for example, the story of Purser Jim Summit who was once invited, along with an opera singer, to a reception by old "Black Jack" Pershing. The purser and his friend had a drink together first and decided it would be fun to swap clothes before going to Pershing's cabin. The singer put on the purser's uniform and he donned her gown. Black Jack was shocked and threw them both out, demanding the dismissal of Summit. Later, he was quietly rehired.

Special menus honored certain passengers. Once when Douglas Fairbanks and Mary Pickford were aboard, their menu contained an acrostic, the first letter of each course spelling out his name, the last letters spelling hers. Also on that crossing were the Duc and Duchesse de Richelieu, Mrs. Ogden Reid, Rodman Wanamaker, Floyd Gibbons, Dr. Harry Emerson Fosdick, Jascha Heifetz and Gloria Swanson.

Rudolph Valentino was given the former Imperial Suite—cost: $5,000. Radio station WOR installed a receiver in it so Valentino could hear the royal farewell given him over the airwaves. Copies of photographs of him (as on p. 51) sold like hot cakes.

And so the Twenties wore on. All through this decade, when prosperity seemed an eternal blessing, two private groups vied to purchase *Leviathan.* One was invariably headed by William Francis Gibbs; the other was the International Mercantile Marine. Then, in 1929, Paul Wadsworth Chapman of Chicago, an outsider, managed to buy the vessel.

Though she was an aging lady by then, Chapman added one round trip to her customary 14 per year, so cutting down on her periods in port. And in December the overworked liner met a savage gale. Those on deck heard a sharp report; an inch-wide opening in the steel plates extended two decks down.

Leviathan was not in real danger and made it safely to Cherbourg and Southampton, but on her return she took the safer southern route and lost two days. Then came the repair bill, $700,000, and Chapman began to think that shipping wasn't for him.

So the International Mercantile Marine won control of her and the air was filled with rich promise. But the Depression fell upon bright hopes. Round-trip fares for summer tourists dropped as low as $100. One former tourist passenger of those days recalls, "The cabins were quite small; each one contained four bunks in double-decker style, a shelf with mirror and a chamber pot. Bathing was communal, and one had to sign up for a bath."

Many crew members had parties aboard when the

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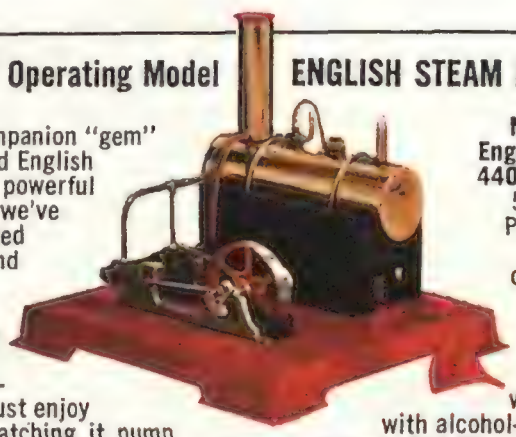

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passenger list was small and their duties light. There was a string of fine cabins rarely used in second class and one beauteous young stewardess set up "housekeeping" in one of them to entertain her friends. One stormy night a heavy sea smashed in the portholes on 12 cabins in this row. The stewardess and her friend for the evening were in the 13th.

The magnificent Pompeian pool was open to crew members at odd hours after midnight, but one stewardess determined to take a dip while passengers were using it. With a cargo of orange gin fizzes aboard her, she paraded through the crew corridor in a very sheer slip, stepped out at poolside and gracefully dived in, stirring immediate interest among the male swimmers. Excitement intensified when she emerged, her slip plastered to her. In no time the chief stewardess got the word. The swimmer was fired on the spot and spent the rest of the voyage in seclusion.

As the Depression deepened, *Leviathan*'s owners grandly announced that they were keeping her in service on previously unscheduled winter voyages. The real reason was to build a record of poor business and so justify laying her up. A cruise to nowhere was offered over Columbus Day, 1932: three days for $35 base cost. Prohibition was still in force ashore, but no longer observed on shipboard, so some 1,800 people were packed aboard and a detail of seamen was organized to keep the drunks from falling overboard. The cruise lost $14,000.

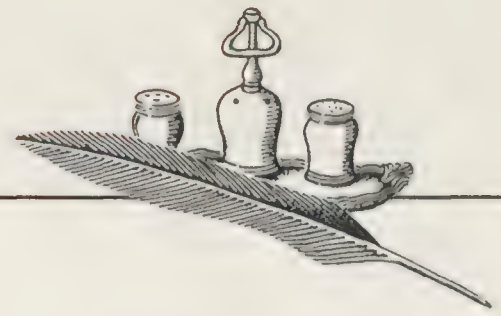
On a departure from Bremen that autumn she carried only 10 passengers in her still elegant first class, 18 in tourist and 41 in third. "We ate in the nightclub as there were so few of us we would have been lost in the dining saloon," one passenger recalled. Another 232 boarded at Cherbourg and Southampton.

Yet the grand manner continued in force. A typical menu included caviar *glacé*, broiled salmon trout, sweetbreads, roast stuffed Maryland turkey, peas, corn on the cob, plum pudding with brandy sauce and mince pie. One economy was loudly touted: No more bowls of caviar for breakfast.

In September 1934 the old lady made her last scheduled voyage, then was laid up in Hoboken. Three years later, while tugboat whistles hooted their hearts out in farewell salute, *Leviathan* sailed for Scotland to be broken up and sold for scrap.

If only she could have been kept four more years, she would have earned her weight in gold as a 25-knot transport, capable of moving nearly 15,000 troops per voyage—the way she had done in that earlier war.

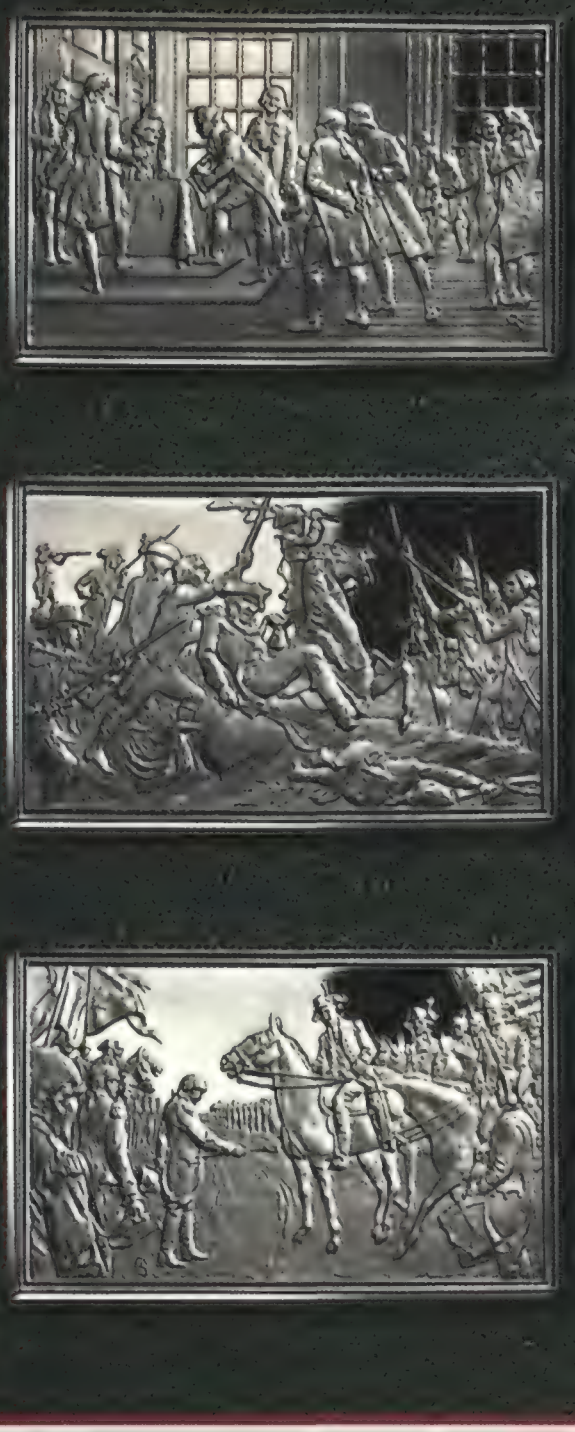
Outmoded, outclassed and nearly forgotten, the old dowager slides under Scotland's Firth of Forth bridge on her way to ship-breakers at Rosyth. She had not been in Atlantic service for four years.



The Bicentennial Council of the Thirteen Original States announces its official series of solid sterling silver ingots to commemorate the 200th Anniversary of the American Revolution

The Official Bicentennial Ingots

in specially-postmarked commemorative cachets



Seventy solid sterling silver ingots depicting the most significant events of the American Revolution. Each ingot encased in an individual cachet, personalized with the name and address of the subscriber. Each cachet postmarked on the 200th anniversary of the event, at the post office serving the site of that event. Issued in a strictly limited edition.

Limit: One Proof Set per Subscriber
Subscriptions Close: November 30, 1973

On December 16, 1773, a small band of American colonists—angered by an unjust British tax on tea—disguised themselves as Mohawk Indians and turned the tide of history. "The Boston Tea Party" fired the flames of freedom and ignited the struggle that was to win us our independence.

On December 16, 1973—200 years later to the day—a solid sterling silver ingot will be issued to commemorate that event: the first Official Ingot of the Bicentennial Council of the Thirteen Original States, the authoritative congress of delegates representing the Bicentennial Commissions of each of the thirteen original states.

This will be the beginning of a series of sterling silver ingots of exceptional importance—officially commemorating the Bicentennial of each of the most significant events of the American Revolution.

Each ingot will be issued precisely on the 200th anniversary of the event it commemorates. Each will be of proof-quality and hallmarked. Moreover, each ingot will be enclosed in a special envelope-cachet personalized with the name and address of the subscriber. The cachet will be postmarked at the post office serving the site of the event commemorated, on the 200th anniversary of the event—to the very day.

70 Great Historic Events

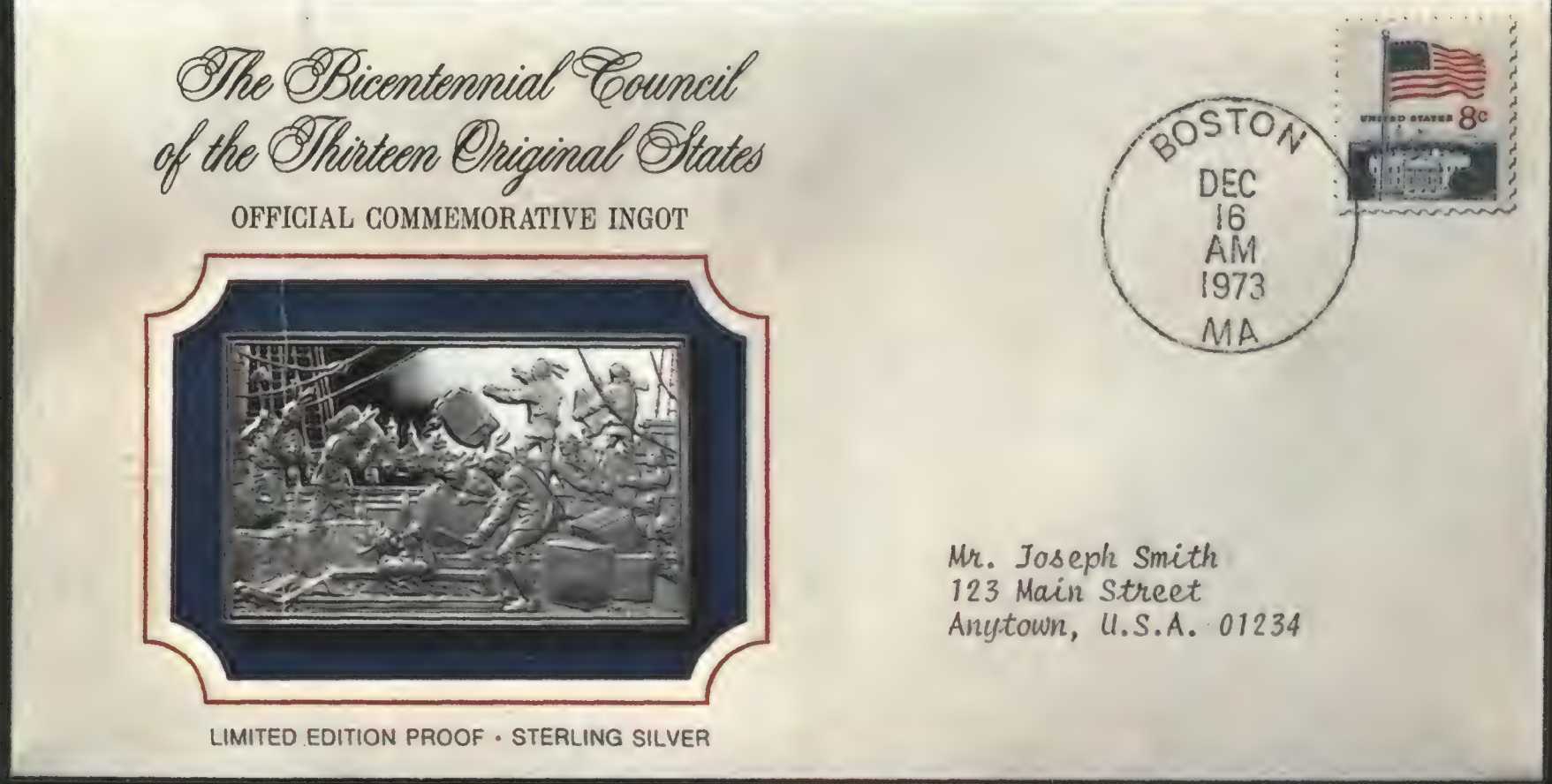
Following the issuance of the first ingot on December 16, 1973, there will be seven significant events commemorated during 1974. The series will then continue throughout the Bicentennial era, with each sterling silver ingot issued on the 200th anniversary of the event commemorated. The final Bicentennial Ingot, to be issued on October 19, 1981, will portray the British surrender at Yorktown.

The entire series of seventy Official Bicentennial Ingots will thus recreate the whole dramatic history of the American Revolution and appropriately commemorate this great historic era for all Americans.

Each Ingot a Work of Art

Each ingot will depict a historically-authentic scene in finely-detailed bas relief, vividly capturing the drama of the event commemorated. Each ingot will be a true work of art designed and sculpted by a skilled American artist. The ingots will be individually struck by The Franklin Mint, the world's foremost private mint, and the total collection will contain over 60,000 grains of solid sterling silver.

To house and display The Official Bicentennial Ingots in their cachets, a custom-made collector's album will be included with each subscription. This album will permit the subscriber to display both sides of each ingot and cachet, including historical reference information on each event commemorated. Subscribers will thus be able to study and enjoy their collection, as it is being acquired.



Shown above slightly smaller than actual size are four of the seventy Official Bicentennial Ingots — The Boston Tea Party (illustrated in cachet), the Signing of the Declaration of Independence, the Battle of Saratoga and the British Surrender at Yorktown. Each sterling silver proof ingot will be issued in a specially-postmarked personalized cachet.

Issue Price Guaranteed

The official issue price for each sterling silver Bicentennial Ingot, including the specially-postmarked cachet, will be $19.50. This price is *guaranteed* by the minter for the entire series, regardless of any increases in the cost of silver during that time. To make this guarantee possible, The Franklin Mint has agreed to purchase, at current prices, a sufficient amount of silver to cover the complete series of seventy Bicentennial Ingots for each subscriber.

The number of subscriptions accepted will be strictly limited to the number of orders postmarked by November 30, 1973. This is the *only* edition of these Official Bicentennial Ingots which will ever be produced. Once the proof ingots have been struck for subscribers, no others will ever be minted.

A Truly Unique Heirloom

The arrival of each Bicentennial Ingot —in a cachet specially-postmarked at the place where the historic event occurred —will give to American families a deeper understanding of the great events surrounding our nation's birth.

As each ingot is collected, as each cachet is studied, families will be reminded anew of the ideals for which the Revolution was fought. From *Concord,* where they fired the shot heard 'round the world—to *London,* where the colonists' "Olive Branch" petition was rejected by the king—to *Paris,* where treaties of alliance with the French were signed—to *Yorktown,* where the British surrendered—each great event will be portrayed in a unique way and commemorated 200 years later to the very day.

The Bicentennial Council is proud to issue these historic ingots—creating an important collection that will have meaning for every American and is certain to become a permanent family heirloom for future generations.

This is the only time that a subscription may be entered for The Official Bicentennial Ingots. All applications must be mailed by November 30, 1973.

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SUBSCRIPTION APPLICATION

The Official Bicentennial Ingots

Mail to: The Franklin Mint
Franklin Center, Pennsylvania 19063

Please enter my subscription for a Proof Set of *The Official Bicentennial Ingots* consisting of seventy sterling silver ingots in specially-postmarked personalized cachets, issued by the Bicentennial Council of the Thirteen Original States.

I enclose $19.50* as payment for the first ingot and I agree to pay for each subsequent ingot as it is issued.

Please make check payable to The Franklin Mint.

**Plus my state sales tax*

Mr.
Mrs.
Miss_____
PLEASE PRINT CLEARLY

Address_____

City_____

State, Zip_____

Signature_____

If you wish your cachets personalized with a different name and address from above, print or type the personalization you wish on a separate sheet and attach it to this application.

Subscriptions Close: November 30, 1973
Limit: One Proof Set per Subscriber

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Photographs by Eliot Elisofon

By S. Chang

Kimono, from its 12th-century origins, is recognized as a lasting sartorial triumph

Despite the inroads of the miniskirt, the Japanese still love their traditional dress and don it for special occasions

In Japan for the umpteenth time, Eliot Elisofon earlier this year had a new litany. "Kimono," he gushed, "is visually the most glorious of things invented by Man." A renowned photographer and documentary film-maker, Elisofon never changed. Whatever his current enthusiasm, he gave himself up to it completely. Typically, he chanted his new litany with such gusto that his Japanese friends could only smile. "Here goes Eliot-*san* again," said one of them. "Don't ever take him to a Japanese restaurant, or he will kill you with his kimonology." Alas, the assignment on kimono from this magazine was to be his last. Only a week or so after he left Japan, he died unexpectedly in New York.

To most Japanese, of course, his last enthusiasm is perfectly understandable; kimono is nothing less than the apex of their sartorial arts. But, unlike Elisofon, the Japanese take it for granted. They use understatement in praising it. Indeed, some of them have been even critical of it, and these critics have included women. Take, for instance, a 19th-century empress of Japan. Her Imperial Majesty said kimono was "unnatural to human body." But this should by no means be mistaken for an imperial attempt at downgrading it. The truth of the matter is quite the opposite. In the time-honored Japanese esthetics, nothing, you see, is perfect without at least one flaw. These critics of kimono were striving to find a flaw in it, but only in order to make it perfect in their eyes. Such is the way in Japan. Elisofon knew this, but he seems to have found it hard to accept.

Kimono, like most other components of Japanese culture, must be traced to China for its origins. But it was never a direct import on yesteryear's slow boats across the Yellow Sea; it can only be described as the result of processes for which the Japanese have long been noted: adaptation and refinement. The first written record of Japanese garb seems to underline the point. There is an eyewitness account in the chronicle of a Chinese traveler who showed up in Japan toward the middle of the third century A.D. "They [the Japanese] wear simple clothes that take the form of a square fabric with a hole in the center," he wrote. "They wear it by penetrating the hole with their head." He was describing the garment worn by women of the lower classes, which must have looked like a poncho. Men of these classes simply draped a straight piece of cloth over their shoulders.

With the introduction of Buddhism sometime after A.D. 500, the Japanese court began to copy Chinese costume, and at a tempo reminiscent of the pace with which Japan centuries later adopted the miniskirt. In 682 a code was drawn up for the imperial household which prescribed, among other things, the mode of dress for each level of the hierarchy. Specified were all things Chinese, including a lacquered headdress running up to a point and a flowing robe with pleats and broad sleeves that almost touched the ground. It was an unabashed transplant from the Chinese court. But the Japanese, here again, were already improvising. For example, with colors: Each rank at the Japanese emperor's court was distinguished by the color

Mameko, one of Kyoto's leading geisha, wears nape-revealing kimono. The lavish *obi* cost $3,600.

Scene from a popular kabuki play, *Chushingura,* shows a samurai and his wife in formal dress.

of the dress uniform. At the bottom of the color scheme was black, for the lowliest attendants, and at the very top, *oni* (a reddish yellow) for the monarch. Wearing a color assigned to a higher rank was cause for arrest.

The chromatic sense was particularly sharp among ladies of the ancient Japanese court. This is amply demonstrated in *The Tale of Genji,* written around the year 1000 by the talented Lady Murasaki. This famous novel, the first in the annals of Japanese letters, is actually about the loves and life of a prince charming in Kyoto—Hikaru Genji. But the author crammed her novel with chatty commentaries on which character wore what. And her discussions of color are, to most male Japanese readers today, painfully long. In the novel a lady appears for dinner in a dress "too pale in color," which is but another excuse for a lengthy dissertation on the psychology of colors and the wearer's presumed state of mind for the evening. And small wonder. There was little else to talk about as far as dress was concerned. In that period a court lady's costume was, in effect, a uniform; they all wore the *juni-hitoe*—literally, "12 layers."

The penchant was for downright overdressing. Sometimes the 12 layers multiplied into 20 for a really sumptuous cascade. To top it all off, they often wore one or more pairs of *hakama* (divided overskirts) and a sweeping *mo* (train), over which trailed a cataract of glistening black hair. A modified version of *juni-hitoe* is still in existence, but it is donned only by female members of Japan's imperial family on state occasions such as royal weddings and coronations. So rigidly uniform was the styling of it that ladies of the court in the days of Lady Murasaki could try for individuality only in their color combinations. A sensible trend soon emerged. With their changing color schemes, these ladies began to reflect or anticipate the seasons. For spring, the combinations of colors often reflected the blossoms of the plum and cherry; for summer, the colors of azaleas; for the fall, blazing foliage colors were fashionable; and in winter the thing to do was to dramatize the contrast between the green of pine trees and the purity of snow. All this they managed to do by mixing the colors of the various layers of the *juni-hitoe.* Even today, the color scheme is an overriding factor in kimono, and the reason is the same as it was almost a thousand years ago: Since the style has not changed at all, color is the only way of expressing one's own taste.

Kimono in more or less its present form surfaced in the 12th century. Then it was called *kosode,* which

S. Chang works for Time *in Tokyo and specializes in Japanese culture. He has a first name, but prefers not to use it. The photographs by the late Eliot Elisofon are the last he took.*

Female characters in kabuki are always played by a man—in this case the famous actor Jakuemon.

means "small sleeve." Originally it was an undergarment worn by Japanese court ladies beneath the broad-sleeved *juni-hitoe* and by samurai warriors under their armor. Then the samurai wives adopted it for everyday outer wear, tying it at the waist with a narrow *obi* (sash).

To begin with, Chinese silk was the regulation material for *kosode*. Then, at the end of the 16th century, Hideyoshi Toyotomi—the greatest hero in Japanese history—gave the local silk industry a remarkable boost. This samurai general of humble peasant origin, whom Westerners call the "Napoleon of Japan," was a great patron of the arts. Hideyoshi invited Chinese weavers, fugitives from the faltering Ming Dynasty, to come to Kyoto and set aside a special quarter of the city for them. The descendants of their Japanese colleagues, the Nishijin weavers, are today among the most versatile of kimono craftsmen in the country. At

Another character in the same play wears white kimono, associated with death, to commit harakiri.

Samurai character in a noh play. Noh costumes, like those of kabuki, have influenced kimono design.

The central figure in this colorful parade on stage is a courtesan, impersonated by a male actor.

the same time, a flood of foreign techniques and materials began to pour into Japan, such as the magnificent Indian silks and the Gobelin tapestries brought in by the Dutch. A blending of all these techniques resulted in a great period for kimono. The Nishijin weavers' contribution is particularly noteworthy. They outstripped their emigré Chinese confreres and came up with a technical breakthrough that enabled them to imitate embroidery by means of weaving. This was the invention of the celebrated weaver Tawaraya, who achieved the effect by "floating" patches of colored threads on the surface of the fabric.

The Yuzen dyers a century later—circa 1700—developed a technique for painting designs on kimono with colorfast dyes. Their method was somewhat akin to that of Indonesian batik, in which the pattern is drawn in dye-resistant hot wax that is later removed. The Yuzen dyers' innovation was to use, instead of wax, a thin paste of glutinous rice flour and egg white which enabled them to draw incredibly fine lines.

Refinements followed. The rich merchant class, for once turning into arbiters of taste, demanded sophistication. Then the Japanese theater, the pantomimic noh and kabuki plays, respectively inspired angularity of form and a flood of exploding colors for the decoration of kimono. Courtesans of the Edo period (1615-1867) also made a contribution in the astonishing development of the *obi*. Once a narrow

This kimono, seen in close-up, combines dyeing techniques with green and gold embroidery.

sash used by samurai women, it became a gaudy ornament almost as important as kimono itself. Kimono today is a summation of all these diverse elements in tradition. The peak of elegance was reached about 200 years ago. Since then kimono has undergone no notable changes.

For all its subtle refinements, kimono has seldom ceased to be baffling to Westerners. Among the first Americans to see it was Commodore Matthew Perry 120 years ago. He promptly disapproved. In the record of his memorable mission to Japan, the Yankee seadog calls it, of all things, "an ungraceful drapery—with much of the undress look of dressing gowns." The chronicle doesn't make it clear just where Perry

Detail of an elegant kabuki kimono with painted bird and peacock feathers on gold background.

studied kimono. Some Japanese today pointedly recall the presence of bordellos not far from where his "black ships" dropped anchor after their transpacific crossing. Was it perhaps in one of them, they wonder, that he made his studies of kimono? Even though history provides no answer, the fact of the matter is plain: Under no normal circumstances would kimono achieve an "undress look," even though in American dictionaries the word has a secondary meaning as "a loose dressing gown usually worn by women." But that is obviously a different garment.

No damper on eroticism

Baffling to the Japanese is the fact that *keto* (literally, hairy ones, but derogatorily, foreigners) misunderstanding could take the opposite direction, too. Typical of this phenomenon is the way a British film producer reacted to kimono last spring. After a stroll through the Ginza on a national holiday, he discussed the many kimonoed girls he had seen. Then he allowed himself to be blunt. "What's so good about kimono?" he demanded. "It covers your women's anatomy so completely." After a pause he asked again, this time sotto voce: "You cover them up so that we foreigners won't become excited over them—right?"

Not right. Kimono could and does excite eroticism among Japanese males, but they look for it where foreigners are not accustomed to—in the nape of a woman's dainty neck. That's why the neckband of kimono, or its position over the nape, is a telling guide to a woman's attitude toward life and sex. For the information of the uninitiated, the geisha throws it back to expose as much of her nape as is technically possible (see p. 60).

In its long history, kimono has gone through only one critical period. That was during and immediately after World War II, when a singular brand of patriotism on the part of a Japanese housewives' association almost completely drove kimono off the streets. To flaunt the luxuries of kimono, officials of the association decided, was against the interests of the Japanese empire. "Think of our soldiers battling far away from home," they argued. "We Japanese women back home must at least look patriotic, too."

Quickly, the meddlesome ladies went to work. Wearing aprons over their own purposely drab kimono, they would accost the more colorfully attired members of their sex and thrust at them a handbill from the association. "Cut off your kimono sleeves,"

Traditional wedding finery. The bride has a wooden dagger stuck in her *obi* as a symbol of protection.

Ribbons decorate a young girl's braids. Her *obi* is tied in what is called a "flowering knot."

the message sternly said. "And work for the empire." Frightened, the women thus warned hastened to lock up their Sunday best in their chest of drawers. For a duly patriotic substitute, they began wearing what was perhaps the ugliest costume in the whole history of kimono. This consisted of a coarse cotton kimono of indigo color and *mompe,* baggy pants akin in style to those donned by the masses in China during the Great Proletarian Cultural Revolution. Soon that combination became a woman's uniform of sorts for a Japan at war.

Kimono's future looked grayer still at the war's end. With the institutions of emperor worship and empire building collapsing, the Japanese desperately needed a new national cult. And they found one in what GIs on occupation duty in Japan had brought along with chewing gum—the American concept of efficiency. Professor Takashi Motoi of Kyoto City University, a foremost authority on kimono, recalls: "The more we brainwashed ourselves on this new concept, the more did kimono look obsolete." True; down the ages kimono has stood for anything but efficiency. "In no time," says Professor Motoi, "we all were convinced

that in the new society that was about to develop in Japan after the war, there would be no place left at all for kimono."

Motoi, and his fellow prophets of doom for kimono, couldn't have been more wrong. It is true that far more Japanese girls than ever before now adopted Western clothes for everyday wear. Kimono as working garb disappeared almost completely. But it didn't die with the Japanese empire. On the contrary, the more Japan recovered in economy, the more did kimono regain its traditional importance. Today, as wear for ceremonies and parties, it is having what could only be called a renaissance. The proof of this is only too visible in the streets of Japan on festival days. The streets then will be practically awash with the radiance of kimono worn by lovely parades of Japanese women. In this fast-changing land, kimono in fact is one of the few visible links between today and yesterday.

But kimono, to say the least, is costly. There was a time when American tourists in Japan would pop into department stores for a "$10 set" to take home as a souvenir. Few Americans do so now. For an antique set of silk kimono and matching *obi,* the price can go as high as $10,000. One Tokyo business tycoon, in fact, is known to have paid as much as $20,000 for his daughter's bridal costume. These incredibly high prices have led to the birth of a new business in Japan —the kimono rental. Commercial wedding halls in Japan invariably have a rental section to fill the needs of many brides-to-be. This is one difference between the old days and now. Once upon a time, a silk wedding costume was like a household fixture: It was handed down from generation to generation for use by all of the family brides.

Another difference concerns the art of wearing it. Professionals like geisha never get dressed for work without assistance from those experts called *hakoya.* For ordinary Japanese women, it was a different story altogether. Until the close of the war, most women were able to put it on alone and tie those heavy *obi* with no assistance from others. No more. Now few girls seem to be able to do it without help from their mothers or sisters. The fact is that there are more than a hundred classes in Tokyo to teach them how to do it.

A test of patience

Nevertheless, the art is declining, for it is complex and demanding. First off, you wear *koshimaki* (scarlet waist wraparound). Then come, in turn, *hada-juban* (soft undervest), *naga-juban* (long undergarment) and finally kimono. To place them all in proper position and keep them there, you need at least half a dozen cloth belts tied as tightly as possible around the waist. For the *obi* itself there have to be *datemaki* (under-sash) and padding to give it proper fullness. And then, at last snow-white *tabi* (socks) for the feet. To wear kimono, in short, is tantamount to a test of patience. But it is often too much for many Japanese girls, to the annoyance of kimono connoisseurs. Another source of annoyance to these connoisseurs concerns panties that young Japanese girls now wear under kimono. Flimsy as the Western piece of garb is, they insist, somewhat improbably, that it breaks the "purity of line." In the past no one wore panties under kimono, but now only geisha seem to abide by the old rule.

All the same kimono perseveres. And that magic still seems to happen when Japanese women climb out of their minis, midis or Pierre Cardins and into kimono. In the process, they always seem to undergo a transformation. Once kimonoed, they appear to assume what can only be called the kimono mind. And that is supposedly everything that once made Japanese women infinitely desirable—obedient, witty and lovely. There is no denying that they look their best in kimono. And some Japanese males with a dreamy turn of mind wish their favorite *keto* women were dressed in it, too. At an old Buddhist temple in Tokyo this past summer, a Japan Marilyn Monroe Admiration Society sponsored a memorial rite to mark the anniversary of the passing of the star. Then a shaven-pated monk at the temple wistfully observed: "Monroe-*san* was one of those foreign girls who would have looked just right in kimono—that's why we loved her so much."

Tetsuko Kuroyanagi, movie and TV actress, strikes a Western model's pose in resplendent kimono.

By Wilson Clark

Interest in wind is picking up as fuels dwindle

Take the ancient idea of windmills, add new designs and storage techniques, change life-styles and you have ample electricity

Windmills may seem spindly, even silly things to suggest when the engines of civilization appear to be running out of fuel. But when you compare the wind to a pile of dead plants, which seems more reliable? For the moving force of our modern, "high-energy" civilization is the massive—but finite— numbers of plants that decayed several hundred million years ago into great organic storage pools in certain regions of the earth.

Ninety-six percent of the energy of the United States is now provided by the fossil fuels—oil, coal and natural gas—and each year we are using up what took nature one million years to produce. The real energy crisis for our civilization is one of survival: We cannot begin to replenish the stored energy of the earth quickly enough to meet future energy use levels.

High-technology alternatives, such as nuclear fusion, are far from proved and, even if they were available today, they would only extend the dependence of civilization on *nonrenewable* energy stocks.

A growing number of scientists seek to harness the constant, dependable renewable energy of the sun, to heat and cool buildings as well as to produce electricity. And one concentrated by-product of solar energy is the wind.

A committee appointed jointly by the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA) has suggested that by the year 2000, less than three decades away, a major American development program in wind power could result in an annual yield of 1.5 trillion kilowatt-hours

Basket-type machine still pumps water in Kansas. A new generation of windmills may do more important work.

of electricity. That is equal to the total electricity consumed in the United States in 1970.

There is nothing new about tapping this great supply of energy. The oldest and most widespread application of wind power was to drive sailing vessels. With the advent of cheap and abundant fossil fuels in the 19th century, however, the great sailing ships were soon replaced by faster, more dependable coal- and oil-burning vessels. But Basil Greenhill, the director of Great Britain's National Maritime Museum, believes that a bold new era is now in store for sail. At the School for Naval Architecture at the University of Hamburg in West Germany, a fleet of "Dyna-Ships"—modernized four-masted clipper ships—is on the drawing board. Credit for the design belongs to 72-year-old Naval engineer and former Shell Oil Company designer Wilhelm Prölss. The sails on the square-rigger extend from the center of the 200-foot masts on curved steel yardarms; they are to be trimmed by remote control from the bridge.

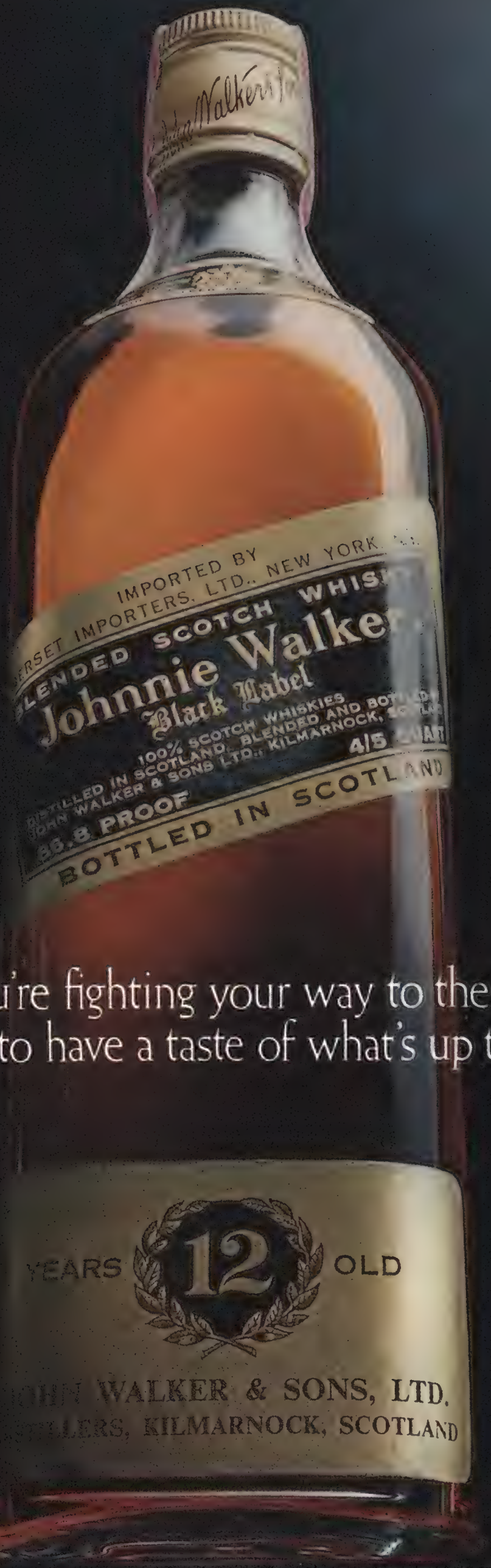
Tests at the University have shown that winds in the North Atlantic would propel the ship at speeds up to 20 knots 72 percent of the time. Auxiliary engines would be used for windless stretches of ocean and for maneuvering in harbors: A fully automated 17,000 ton Dyna-Ship would consume only five percent of the fuel required by the standard contemporary freighter. Rudolf Zirn, wealthy Bavarian lawyer and environmental activist, has recently commissioned the construction of the first Dyna-Ship.

What to do when the wind stops

On land, the interception of wind energy by the blades of a windmill has served as a basic source of mechanical power for centuries. By 1850, the use of windmills in America represented about 1.4 billion horsepower-hours of work, the equivalent energy produced by burning 11.8 million tons of coal. But by 1870 the amount of power produced by the windmills had been cut in half. The steam engine, driven by fossil fuels, had come to stay in America.

The American windmill industry remained a thriving business, however, into the early 20th century. In the 1920s companies began to develop wind-powered electric generators, but in the 1930s the death knell was sounded for wind machines of both the water-pumping and the electricity-generating variety when the Rural Electrification Administration was established by President Franklin D. Roosevelt. The picturesque prairie windmills began to fall into disuse.

A question about wind power asked by Depression-ridden farmers in the Thirties is the same one asked now on TV commercials by a large oil company: What do you do when the wind stops blowing? How do you



As you're fighting your way to the top
it helps to have a taste of what's up there.

ABOUT $10 A FIFTH. PRICES MAY VARY ACCORDING TO STATE AND LOCAL TAXES. 12 YEAR OLD BLENDED SCOTCH WHISKY. 86.8 PROOF. BOTTLED IN SCOTLAND. IMPORTED BY SOMERSET IMPORTERS, LTD., N.Y., N.Y.

store the wind? Today's wind generator enthusiasts have several answers.

In a home-sized wind power plant producing direct current (DC) power, storage is accomplished by charging batteries. In a large system designed to feed electricity into the power lines of an electric utility, energy can be stored mechanically (or hydraulically) by pumping water or air into a reservoir, then releasing it at a later time to drive an engine operating an electric generator.

Another storage device is a flywheel, similar in principle to the familiar spinning top or toy gyroscope. Like a gyroscope, the flywheel can be spun by the input of energy (in this case, wind-generated electrical power) and storage is in kinetic energy—that is, motion. In a system designed by Florida engineer John Roesel jr., the blades of a wind generator turning a shaft at 120 revolutions per minute might be stepped up to 24,000 rpm to spin a flywheel. While spinning, the flywheel stores energy that could later be tapped as it "runs down" after the wind stops.

A properly designed flywheel, made perhaps of pressed bamboo and enclosed in a vacuum chamber to minimize friction (the main energy loss in the system) is not only much more efficient than battery storage, but is potentially cheaper. Compared with lead-acid batteries which store only 8-10 watt-hours of electricity per pound of material, the envisioned bamboo flywheel would store more than 20 watt-hours per pound. Such a wind-power system for a home would be capable of storing enough energy to provide electrical power for a week of windless days.

Yet another "storage" technique is the production of a synthetic fuel—hydrogen. Hydrogen has many of the fuel properties of natural gas (see SMITHSONIAN, August 1972) and can be produced by the electrolysis of ordinary water. A wind generator could furnish the electrolyzer with electricity to break the water molecules down into their constituent parts—hydrogen and oxygen. The hydrogen would then be compressed and stored for later use as high-grade fuel.

This "modernistic" approach to the energy storage problem was first applied in connection with wind power before the turn of the 20th century. In the 1890s Danish professor and wind-power pioneer Poul La Cour produced hydrogen and oxygen fuel by using wind-generated electricity to electrolyze an aqueous solution of sodium hydroxide. The local high school at Askov, Denmark, where La Cour taught, was illuminated by "Drummond Light," which was an oxygen-hydrogen flame directed on a zirconium element, causing it to emit a brilliant light.

Mr. Clark has assessed solar energy and hydrogen as a fuel in earlier issues of SMITHSONIAN. *This article is based on his forthcoming Doubleday book.*

Proposed for New England's electricity needs:
huge windmills to make hydrogen fuel from seawater.

In addition to these proposals and methods for various forms of wind-energy storage, a number of researchers have suggested the direct coupling of wind plants into a regional utilities grid to avoid the necessity of storage altogether. Ernst Cohn, manager of Solar Chemical Power Systems for NASA has summarized the arguments for this approach:

"Pick the areas in the U.S. where they have the right kind of wind velocity, and the right kind of wind durability, and put your windmills up and feed their power into a grid. You use them as base power, with no storage. . . . On a day when you have no wind—which will probably not happen for all windmills anyway . . . you use conventional fossil fuel power if you need to." Such a system, Cohn predicted, "would prove competitive today."

There have been schemes for large-scale use of wind power in the past. During World War II, a massive 1,250-kilowatt wind electrical station was operated at "Grandpa's Knob" in the mountains of central Vermont. Things went smoothly for about 16 months, un-

til a main bearing in the generator failed in February 1943. Because of wartime shortages, the company was unable to replace the bearings for more than two years, during which time the blades were locked in place and subjected to continuous buffeting of the wind, with accompanying stress on the machinery and blades. After the bearing was finally replaced, the wind station operated for less than a month. On the morning of March 26, 1945, cracks widened in the spars of one of the machine's eight-ton blades which suddenly gave way and was hurled 750 feet through the air, landing on its tip. It was never repaired, and the nation's first experiment with wind-generated commercial electricity was ended.

Interest in the large-scale production of wind power in America was renewed in 1970 by William E. Heronemus, professor of civil engineering at the University of Massachusetts. Over the past three years, he has proposed wide-ranging networks of huge wind generators in numerous U.S. locations to provide virtually all the nation's electricity.

For example, Heronemus proposed a wind system as a substitute for the nuclear power plant now scheduled for construction in Shoreham, New York (and a similar system for New England; see drawing, p. 73). The first of two networks of floating wind-power stations would be emplaced off Long Island, beginning in 1975. The wind stations would be mounted either on towers planted in the relatively shallow shoal waters, or on 500-foot by 200-foot semisubmersible platforms. Each station would support three wind towers, each of which would in turn house two 200-foot diameter wind turbines. The two-blade turbines are based on the Grandpa's Knob model, as refined by a study performed after World War II by New York University. Six hundred and forty of these wind stations would be linked together along 16 north-south

Robert Reines and his associates built this dome in New Mexico as a year-round home. Called

lines. The wind generators would produce electric current for powering electrolyzers, machines which convert water to hydrogen and oxygen. The oxygen might be released to the atmosphere, while the hydrogen gas would be pumped into underwater tanks and stored for later use.

Heronemus believes that power from the offshore system would be economically competitive with future conventional electric power costs in New England. He also points out that due to the decentralized nature of wind technology, the loss of a single wind turbine would not cripple the electric service area with a huge blackout. For example, the April 1973 blackout affecting 150 miles of Florida's "Gold Coast"—from Fort Pierce down into the Florida Keys—was caused by a single nuclear plant failure. "One wind station disabled would mean one-thirteen thousandths of the system capacity would be lost," Heronemus says, as opposed to the complete system loss that can be precipitated by a nuclear station failure.

There are other efforts under way. Scientists at the

Prototype I, it is heated by solar energy and
it contains the usual appliances, powered by wind.

NASA Lewis Research Center in Cleveland, Ohio, hope to build a 100-kilowatt wind machine there in 1975. A later version of the generator may be emplaced on the Island of Culebra off Puerto Rico under a contract with the National Science Foundation.

NASA officials believe that with mass production, electricity generated by wind power will be available at capital costs which a decade from now will be competitive with nuclear plants. Dr. Joseph Savino, technical director of the NASA Lewis Wind Energy Program, contends that "there's enough energy in the winds to supply all our electrical needs. If the Danes could get 200,000 kilowatts of electricity from the winds back in 1908, we should be able to get the power we need right now."

Another way to get power we need from the wind may be to think small. Availability of wind power in local areas has historically been a factor in the location of homes and buildings because architecture was based to a large degree on the relationship of buildings to the winds. Only the last few decades of massive exploitation of fossil fuels have caused the window to become essentially a repository for air conditioners rather than a device for opening the interior of structures to the cooling winds. As the availability of cheap fossil fuels decrease, perhaps windows will once more assume a functional meaning.

An important asset of wind energy is its free distribution over the seas and continents. The energy which currently powers our country is transmitted as liquid fuel or as electricity in pipelines and power lines, which are costly transport systems. The small-scale use of wind power would eliminate the costs of transmitting electricity from central facilities.

Scientists at the Brace Research Institute at McGill University in Montreal, a leading international center for research into natural energy sources, have worked with wind generators for small-scale use in agricultural areas and low-energy societies. The Brace windmills have a variety of uses, from water pumping to electricity production. One unique design is the Savonius rotor, named after Finnish engineer S. J. Sa-

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The T.S.S. Fairsea is of Liberian registry.

vonius, who designed wind plants in the 1920s. The Brace version calls for cutting two 45-gallon oil drums in half lengthwise and welding them to form troughs that scoop up the wind and keep the rotor turning.

An enterprising group of young communards in Wisconsin, calling themselves "Windworks," have built a number of small electric wind generators, including a unit designed for Buckminster Fuller, who has provided some financial support for their Spartan efforts. Led by graduate aeronautical engineer Hans Meyer, the group has designed several innovative wind plants which can be built cheaply with easily attainable materials. One can be built for less than $200.

Near Albuquerque, New Mexico, Robert Reines and the Integrated Life Support Systems Laboratories built the world's first dome structure powered totally by wind and solar power.

Their first wind generator was installed in February 1972. The remainder of the year was spent rebuilding two other used wind generators and making a solar heat collector for use in heating the dome and for domestic hot water. In all, it cost them more than $12,000 over a ten-month period to plan and build the home, which they named "Prototype I" in anticipation of more sophisticated designs (see pp. 74-75).

Wisconsin communard works on wind generator with furled sails, one of several the commune has made.

A full range of appliances

Electricity for the dome is supplied by one reconditioned wind generator, the equivalent of more than five kilowatts of installed electrical capacity. (The other two generators supply other equipment.) A bank of 16 heavy-duty batteries store 22,000 watt-hours of current which supplies a full range of appliances, including a hi-fi set, tape recorder, television set, refrigerator, electric fan, pumps, mixers and an electrically operated chemical toilet. Reines is convinced that solar-heated, wind-powered domes can be produced for $15,000-$20,000 each.

The only commercial distributor of home-sized electric wind generators in the United States is the Solar Wind Company of East Holden, Maine, which sells Swiss and Australian wind generators. Henry Clews founded the company when he attempted to purchase a wind generator for his home in Maine but found that he had to import a machine all the way from Australia.

Yet another approach is the use of medium-sized wind generators of 15 to 20 kilowatt capacity (perhaps as high as 100 kilowatts). These would produce electrical power in favorable locations for small communities. As the needed generating units increase in size, costs decline somewhat, so that the projected investment per person in such a scheme might drop to 20-50 percent less than the costs of individual house generating units. The central drawback is the nature of the wind's energy.

Smaller generators would be more expensive per person, but due to the variations in available wind power in most locations, a community network of wind generators might extract more overall power than one large machine.

Such wind stations might operate in combination with solar-energy equipment to fulfill total energy requirements, but the solar equipment in most places would remain on rooftops, not in central facilities. Only in sunny areas with high solar values could solar collecting equipment be centralized for redistribution to individuals in the system.

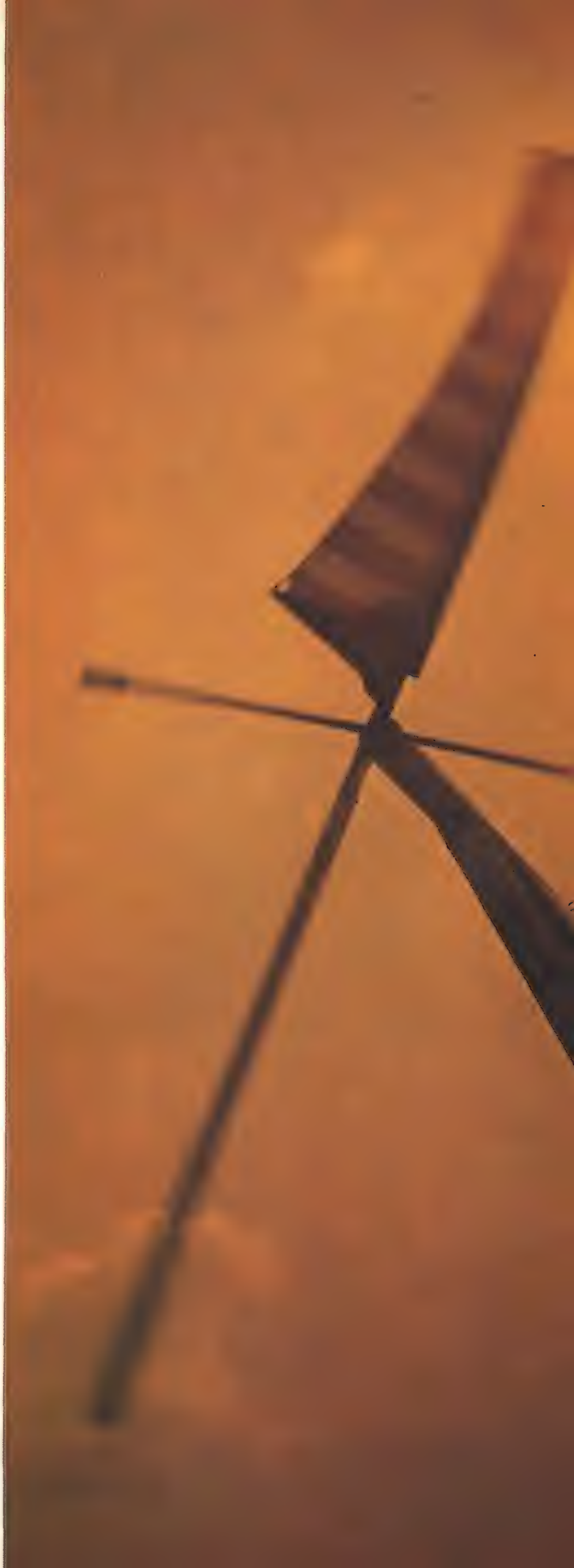
The technical aspects of building wind generators are remarkably well understood. French engineer Louis Vadot, who chaired the sessions on wind-power generation at the United Nations' 1961 Rome conference on new energy sources, noted that: ". . . It is now generally agreed that the design of wind-power plants with capacities ranging from the lowest levels to far beyond 100 kilowatts no longer presents any fundamental problems . . . our knowledge is sufficient to be usable in a more or less routine way and without need

to be on guard against surprises." Given the potential of wind power as a renewable future energy source with minimum pollution, it is surprising that the federal government and private industry show so little interest in its development. The National Science Foundation intends to spend $1.25 million in 1973-74 to assess the development of wind power. The funds will come out of the administration's request to Congress for $872 million for energy research and development. While the director of the program, Louis Divone, is enthusiastic about the merits of wind power, the sum hardly seems a serious commitment.

On the other hand, Basil Greenhill of Britain's National Maritime Museum, has described the pitfalls of *not* developing wind power for shipping, and his analysis may well hold true for power plants as well.

Suppose the energy crisis forces a shortage of conventional fuels necessary to build modern wind-powered ships. "Such a situation," Greenhill says,"would mean virtually a return to a man- and animal-powered wood-fired industry. There would not be the resources ashore to build a sophisticated vessel of the type I have described. . . . Perhaps the design and experimental work on the development of modern merchant sailing vessels should be begun soon, before the crisis is actually upon us."

As is the case with wind-driven ships, the penalties for delay in developing wind power and all other natural energy sources are great. The technologically rich nations are right to be alarmed about fuel shortages, but the answer may not lie underground. It may be, as the song says, blowin' in the wind.



Like twin jibs, the striped sails of a windmill at Princeton University adjust themselves to the wind.

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By Eve Cockburn

Autopsy team seeks a mummy's medical secrets

Beneath rock-hard layers of dried resin survive some fingerprints of several diseases and disabilities of ancient Egypt

The operating table was wheeled in. The waiting men pulled on rubber gloves, checked surgical instruments, discussed their plan for the operation. The patient took no part in the conversation—not because he was anesthetized, but because he had been dead for about 2,700 years.

This was the scene last February 1 in a dissecting room at Wayne State University School of Medicine in Detroit, where the autopsy of an Egyptian mummy was about to begin. Determining cause of death was not the researchers' main goal. Instead, they were after medical history: specifically, the medical history of the man whose body lay before them. What was the condition of this ancient corpse? Did it still contain evidence of the diseases the "patient" once suffered from? Did the body still retain its immune responses to infectious agents? Were any viruses preserved in his body? Such information would not only be interesting for its own sake, but could affect our understanding of disease 2,700 years later.

Aidan Cockburn, a Smithsonian research associate in physical anthropology and the author of two books on the evolution of infectious diseases, had long been interested in paleopathology, the study of ancient diseases. Primary evidence of disease generally comes from skeletal remains, the most abundant relics of earlier peoples. But Cockburn wanted to look for clues about the history of infections in the preserved tissue of Egyptian mummies.

A unique team of medical and anthropological experts carefully remove solidified wrappings from

Mummies had been studied many times before. An English pioneer in paleopathology, Augustus Bozzi Granville, had made a detailed dissection of an Egyptian mummy as far back as 1820 (he concluded she died of "ovarian dropsy" about 500 B.C.). In the early 1900s, English scientists examined thousands of preserved bodies unearthed by the first Aswan project. Individual studies on mummy bones and tissues have suggested the presence of several diseases in ancient Egypt, including respiratory conditions like pneu-

Eve Cockburn, whose husband largely organized the mummy autopsy, is editor of Paleopathology Newsletter, devoted to the diseases of ancient man.

"PUM II," a male who lived about 700 B.C. Autopsy revealed his organs to be in good condition.

monia and tuberculosis, poliomyelitis, smallpox, schistosomiasis, arthritis and scoliosis. But the 1973 autopsy of a mummy in Detroit was significant because it brought together a large team of specialists in medicine and anthropology who were eager to try the latest diagnostic techniques on mummified tissue.

Dr. Cockburn had earlier conducted a hasty autopsy of a mummy that belonged to the Detroit Institute of Arts. Along with William Peck, the Institute's curator of Ancient Art, and Robin Barraco, a physiologist from Wayne State's medical school, he had cut a panel from the mummy's abdomen, using an old set of surgical instruments that, though not exactly predynastic, had seen service at the Battle of Jutland in 1916. The three were delighted to find several organs in a good state of preservation. These were handed out to specialists for further study.

On a trip to Egypt, Cockburn met David O'Connor of the University of Pennsylvania. O'Connor, a curator of the University Museum's Egyptian section, immediately responded to the idea of doing research with some of the mummies already in the United States. He offered to lend some from his museum for future investigation. The first of these autopsies, conducted in Philadelphia in May 1972, was largely abortive. The body (known as PUM I, for Pennsylvania's Uni-

versity Museum) turned out to have been simply wrapped in cloth, not embalmed, and the tissues were unsuitable for study.

Now, as part of a symposium on "Death and Disease in Ancient Egypt," a second mummy had been flown from Philadelphia to Detroit for examination.

The first step had been to take both x rays and xerograms: The latter are similar to x rays but show soft tissues in better detail. It became immediately obvious that this mummy really was in excellent condition, properly mummified and well-preserved.

On the day of the autopsy, the dissecting room was set up with a pair of x rays on screens to serve as guides. The outer wrappings were slowly and carefully unwound and came off with little effort. First there were broad, finely woven strips wrapped latitudinally around the body, then longitudinal strips running the full length. Trouble soon started, however, for the embalmers had poured hot resin liberally at all stages, so that many of the 12 layers of wrappings were now a solid mass.

Working part of the time with hammer and chisel, like sculptors releasing a dynamic form from a solid block of stone, the researchers began to chip away at the swathed figure, and PUM II slowly emerged from the cocoon where he had spent so many years. Each toe, leg and finger had been wrapped separately before the final layers had been placed in position, and it took eight hours of hard work by half a dozen people before the whole body was finally exposed.

Each new revelation confirmed that this mummy was indeed a treasure. The fingernails and toenails were intact and stained reddish. The soles of the feet had been painted white. Eyelashes were still in position, and whiskers on the chin were clearly visible. The arms, crossed over the breast in traditional style, added to the total impression of a serene personality, who seemed to reach out across the ages to these 20th-century scientists.

It also became obvious that one radiologist's preliminary guess that it was a female had been a gross misdiagnosis. The mummy had a three-inch penis,

Wrappings are chiseled from the face; the eyelashes proved to be intact, the eyes whole but shrunken.

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carefully elevated with a piece of wood. He had not been circumcized, however, as was the case with many early Egyptians. The testicles had been removed, apparently by pulling them out through the pelvis.

Once more, as with the previous mummies, a square panel was sawed from the abdomen, and several packets were removed. During the mummification process, the internal organs were generally removed through an incision in one side, then either placed in Canopic jars for burial with the mummy or wrapped separately and replaced in the body cavity.

In this mummy the incision was unmistakable. It was about five inches long and had been stuffed with pieces of cloth. The whole site, including the stuffing, was removed with a Stryker saw. This surgical instrument, which will be remembered by anyone who has ever had a cast removed, proved to be an invaluable tool during the autopsy. As the saw cut through the casing, the resin burned, blue smoke curled above the body and a delicate scent was released to mingle with the already pervasive smell of perfumed linen—an aromatic, spicy smell familiar to anyone who has worked with mummies.

J. Lawrence Angel, curator of physical anthropology at the Smithsonian, and Eugen Strouhal, a visiting Czech anthropologist from the Náprstek Museum in Prague, measured bones and examined the body for physical evidence that could be used for dating purposes. Strouhal disapproved of using parts of the mummy for carbon dating, because so much valuable and irreplaceable material is consumed. His opinion, based on such cultural evidence as the painting of the fingernails, the position of the arms and the manner in which the mummy was wrapped, was that the probable date was the end of the Third Intermediate Period, around 700 B.C., when ancient Egypt was in its final decline. This date also seemed likely in view of other details of mummification: for example, the organs being replaced in the abdomen in carefully wrapped packages, rather than in jars. Strouhal took specimens of resin back to Czechoslovakia, where his colleagues are analyzing them to check further on the dating.

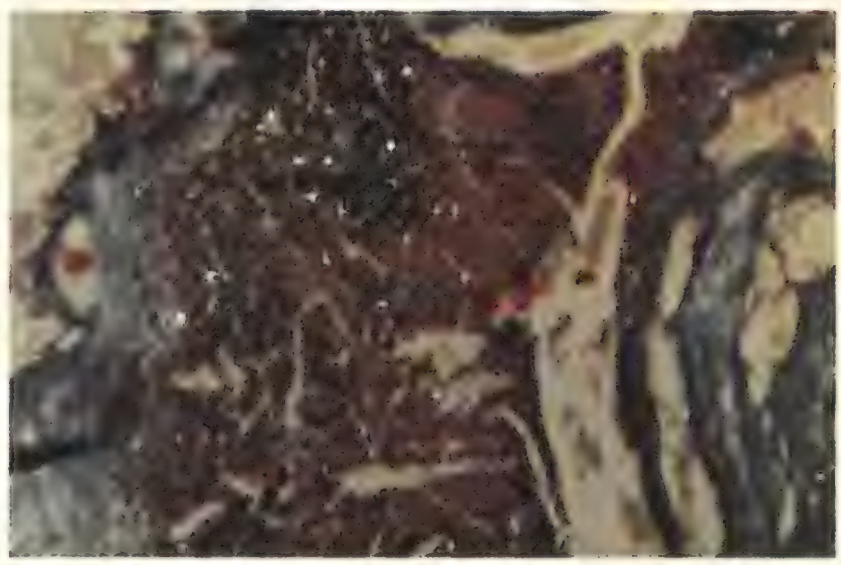
Worn teeth, a different bite

The mummy's teeth were worn down far more than those of 20th-century man, a natural result of eating rough grains, possibly mixed with sand. Angel pointed out that the edge-to-edge bite (rather than upper teeth overlapping the lower as is usually found today) was common in earlier ages. Evidence from the bones led Angel to place the man's age at death between 35 and 40 years.

One of the most striking sights was PUM's right leg. It was much larger than the left, due apparently to

A well-preserved cell (circular formation with dark nucleus near center) attests to embalmers' skill.

Inside the abdominal cavity can be seen the backbone and the "packages" in which vital organs were stored.



In this photomicrograph of lung tissue under polarized light, the tiny bright spots are typical of silica.

some swelling, and showed marks on the skin which indicated that the leg might have been filled with fluid at the time it was wrapped. In addition, the toes were severely distorted, so that the foot itself appeared deformed. The x rays had shown earlier that the fibula (outer lower leg bone) was abnormally thickened. A pathologist in charge of the autopsy, Dr. Theodore Reyman, immediately removed a three-inch segment of the fibula for microscopic examination. He did this by taking a small section from the calf, for the researchers were pledged to leave the outer appearance of the body as normal as possible. The mummy was placed on display at the University Museum at the University of Pennsylvania after the autopsy, and is expected to arrive at the Smithsonian before Christmas for exhibition in the National Museum of Natural History.

As soon as PUM II was fully unwrapped, it became obvious that the skull had not in fact been fractured as one of the radiologists had suggested earlier. There were some superficial scratches on the scalp, which probably, in the course of embalming, had filled with something opaque to x rays.

The next step was to saw a window in the skull. X rays had shown a substance inside. It was not brain tissue but resin, which had formed a pool in the back of the skull and then solidified. The embalmers had punched a hole via the left nostril through the base of the skull: This would have been used for removing the liquified brain. Some of the resin had also run down the spinal canal, replacing the apparently disintegrated spinal cord. The dura mater, the fibrous membrane lining the skull, was clearly visible but unfortunately no brain tissue was attached.

George Lynn and Jaime Benitez, doctors at Wayne State's medical school, were interested in studying the mummy's middle and inner ears. They cut cores from

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The toes of the right foot (left as you look here) were curled by tight wrapping, not by disease.

behind each ear to remove both temporal bones, but replaced the outer plug of bone for cosmetic effect. Later examination showed that the right eardrum had been perforated, indicating that PUM II had suffered from some ear inflammation. This is thought to be the earliest record of a perforated eardrum.

Lynn and Benitez were also fascinated to discover a small beetle larva, just a millimeter-and-a-half long, inside the ear; it was later identified as belonging to the family Staphylinidae (see p. 88). Mummified insects have been found many times before. Certain kinds of insects are attracted to decaying flesh, and some of these are inevitably caught in the embalming process. One of the packets in PUM's abdomen was covered with pupae. Two identifications have now been made, one of a blowfly and one of a cheese skipper.

Dr. Reyman has begun detailed work on the abdomen packets, taking as little as possible in each case. The rest was saved in the hope that future techniques would reveal new solutions to the problems of diagnosis. He has identified one packet as lung tissue. To his surprise, it contained black particles, similar to those found in the lungs of miners suffering from anthracosis. PUM II may have inhaled them from sooty lamps or from smoky fires. There were also traces of silica (see p. 85), often found in quarriers' lungs, but PUM's delicate hands and costly funeral do not give the

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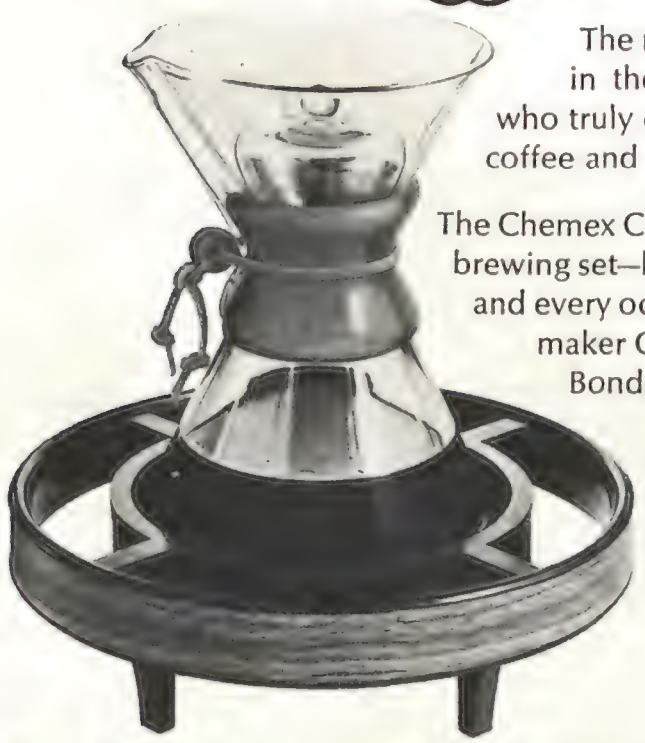

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Beetle larva found inside one of the mummy's ears.

impression that he was a man of the laboring classes, so perhaps this was the result of the inhalation of sand during sandstorms.

Reyman has also made sections of the major arteries. Red blood cells are clearly distinguishable in some vessels, while the aorta showed evidence of a type of arteriosclerosis or hardening of the arteries. This is common enough today—but it would certainly be interesting to know whether it was also a common disease in ancient Egypt.

Naturally, the right leg was the subject of much heated discussion. A second set of x rays was taken, but this time expert opinion was that the twisted foot, instead of being a congenital deformity or the result of disease, was simply caused by tight wrapping after death. The condition of the fibula, at first attributed to an infection, was now diagnosed as being the result of some chronic inflammatory condition—perhaps varicose veins.

One of the group's major goals is to find intact protein in the tissues; amino acids, the components of proteins, have been found before. Dr. Barraco spent 18 months working on the tissues he had obtained from the Detroit Institute of Arts mummy. He successfully established that proteins, or at least nearly intact proteins, are definitely present and identifiable, and he

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obtained an extract of what may well be pure protein.

PUM II is even better preserved, so the next step is to look for blood proteins like hemoglobin and gamma globulin which might provide traces of disease. For example, if an abnormal hemoglobin like sickle cell were detected, it could shed light on the history of sickle cell anemia, a blood disease which may have originated in Africa and is prevalent among blacks today (see SMITHSONIAN, October 1973). The sickle cell may provide resistance to another persistent disease, malaria.

If gamma globulin is found, there is a chance of detecting specific antibodies which would have formed in response to infectious agents. Then it would perhaps be possible to test for antibodies against mumps, measles and smallpox viruses. Electron microscopy may also reveal other viruses in PUM II's body.

Clues to the evolution of diseases

What will this patient collection of facts reveal? Each new fact dug up from the past helps illuminate the overall health of an ancient population and how it responded to the environmental stresses of its time. Eventually, enough facts may be accumulated to permit the development of theories on the evolution of diseases and infections: This would provide a better understanding of those of today and may well be a signpost for the future.

To reach firm conclusions, though, about death and disease in ancient Egypt, many more autopsies will have to be performed and much more evidence is needed. And results from the bodies themselves must continue to be supplemented with medical clues from ancient writings, sculptures, pottery and paintings.

The study of ancient disease can be expanded far beyond Egypt, of course. Mummification was practiced in both Peru and the Aleutian Islands. Just recently, Chinese scientists autopsied a woman whose body had been kept for 2,100 years in an airtight coffin, preserved in a fluid which had kept the tissues intact.

Natural mummification occurred in dry desert sands in many parts of the world and in the bogs of Denmark and Germany, where bodies have been preserved in peat since the time of Christ. Then there are early examples of what we would now call cryogenics. Imagine what could be learned from examining the bodies of Scythians frozen in the Asian permafrost since 400 B.C.—or a woolly mammoth preserved from prehistoric times. PUM II is just the beginning.

The mummy's hand, fingernails painted red, holds a posture of serenity rather than late-movie horror.

Text and drawings by Wayne Barrett

George and Betsy and Polly and Patsy and Sally...and Sally...and Sally

Young Washington fell in love hard and often,
but the girl he pursued most ardently
was the only one he could never hope to win

Bigger than life, George Washington in marble sits on a throne in the Smithsonian's Museum of History and Technology. Sculptor Horatio Greenough modeled the figure after a statue of Zeus, and the heroic pose idealizes the image of Washington engraved in the public mind: Washington, the man-god; he could not tell a lie; he certainly could not covet his neighbor's wife.

Or could he?

"The World has no business to know the object of my Love,—declard in this manner to—you, when I want to conceal it. . . ." Washington wrote these words four months before he married Martha Custis, but he didn't have Martha in mind. He was confessing his love to a married woman—Sally Cary Fairfax.

Although the love letter to Sally has been known for nearly a century, many of Washington's biographers have paid it scant attention. By ignoring or minimizing this and other declarations of his passion, they produced an image of the hero as cold as Greenough's sculpture. This was a gross injustice.

A ruggedly handsome man in his prime, George Washington stood over six feet tall and weighed close to 200 pounds. Despite long legs and big feet, he moved with grace—notably on the dance floor. He had deep-set eyes of penetrating blue-gray and wore his mop of reddish-brown hair neatly in a queue. A firm mouth closed over his troublesome teeth (he cracked nuts with them) and a few smallpox scars blemished his noble nose. His fair skin was often sunburned.

In his boyhood years at Ferry Farm on the Rappahannock and at Mount Vernon on the Potomac, he found time for Virginia's bumper crop of ripening young maidens. Well before he attained his majority, young George was preparing for the harvest. He took dancing lessons, paying for them out of his own purse, and acquired a handsome wardrobe made to his order by London tailors. He also bought a razor. He learned gentlemanly manners from admonitions he copied in his schoolboy's notebook: "Wear not your Cloths, foul, unript or Dusty but See they be Brush'd once every day at least and take heed that you approach not to any Uncleaness."

Properly brushed and undoubtedly clean-shaven, Washington at 16 rode into the wilderness to help survey the Shenandoah lands of Lord Thomas Fairfax, proprietor of some five million acres in northern Virginia. In a letter to Washington's mother, Lord Fairfax noted that her son had a hot temper and was "beginning to feel the sap rising, being in the spring of life, and is getting ready to be the prey of your sex, wherefore may the Lord help him. . . ."

The sap was indeed rising. George had a crush and, like many young lovers, turned poet:

From your bright sparkling Eyes I was undone;
Rays, you have more transperent than the Sun,
Amidst its glory in the rising Day,
None can you equal in your bright array:

And so on, each line beginning with letters that, by the end of the poem, spell out FRANCESALEXA. Frances Alexander?

Perhaps it was for the same mysterious miss that Washington composed a second poem, written, as was

A Washington, D.C., free-lancer, Mr. Barrett wrote about sea mammals in SMITHSONIAN, *February 1972. He draws news portraits for* The Wall Street Journal.

Horatio Greenough's Washington sits imperially in Smithsonian Museum of History and Technology.

This angle suggests the possibility of warm blood pulsing beneath the sculptor's cold toga.

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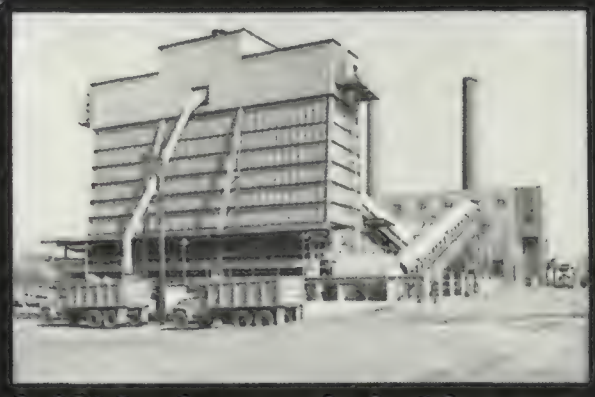

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the first, when he was about 16. He did not shackle his muse this time with an acrostic—or, for that matter, with punctuation:

Oh Ye Gods why should my Poor Resistless Heart
Stand to oppose thy might and Power
At Last surrender to cupids feather'd Dart
And now lays Bleeding every Hour. . . .

Young George's poor resistless heart suffered one assault after another. In a breathless letter to a cousin, George wrote that he was staying at Lord Fairfax's estate in the Shenandoah Valley, "where I might was my heart disengag'd pass my time very pleasantly as theres a very agreeable Young Lady Lives in the same House (Colo. George Fairfax's Wife's Sister) but as thats only adding Fuel to fire it makes me the more uneasy for by often and unavoidably being in Company with her revives my former Passion for your Low Land Beauty. . . ."

The agreeable young lady was Mary Cary. Her older sister Sally, newly wed to George William Fairfax, had not yet struck the spark that would ignite Washington's tender heart. Legend says that at the palatial James River estate called Carter's Grove, Mary rejected Washington's proposal of marriage. Legendary, too, is the identity of his "Low Land Beauty." A harem of candidates have been nominated, among them Lucy Grymes, who became a grandmother of Robert E. Lee.

But there is nothing legendary about Washington's courtship of brown-eyed Betsy Fauntleroy. He was 20, she a high-spirited beauty almost 16 when, in 1752, he asked her to be his wife. She turned him down twice. Within a year he joined the Virginia militia and won a major's commission.

A way with the women

Washington, apparently, had a way with the women. His aide, Captain George Mercer, wrote him revealingly from Charleston, South Carolina, offering this frank if biased appraisal of Southern ladies:

"Youl be surprized I have not yet mentioned the fair Ones I wish I could call Them so, I assure you they are very far inferior to the Beauties of our own Country, & as much on the Reserve as in any Place I ever was . . . many of them are crooked & have a very bad Air & not those enticing heaving throbbing alluring plump Breasts common with our Northern Belles. . . ."

Captain Mercer had accompanied his friend to Boston in 1756, when Washington, then a Virginia colonel, sought a royal commission in the regular army from Massachusetts Governor William Shirley, the ranking Colonial authority. For Washington, the journey was a disaster. He failed to obtain the commission, lost heavily at cards and, in New York, bungled the opportunity to lead a wealthy young heiress to the altar.

She was Mary Philipse, 26, a deep-bosomed beauty who owned 51,000 Hudson Valley acres. The dashing Virginia colonel, just turned 24, donned his scarlet, blue and silver regimental finery and mounted an attack on the lady's affections. He dallied with her in New York for nearly a week before proceeding to Boston. On the way back he spent a few days more, taking her to dances and a mechanical toy show that was the rage of New York. Before he left, he had to borrow £91.

Washington "had the blood of a lover beyond his fellows," reflected a later Virginian, Woodrow Wilson. "Despite the shyness of a raw lad who lived much in the open, he had relished the company of lively women from the first, meeting their gay sallies sometimes with a look from his frank blue eyes that revealed more than he knew. . . . Mary Philipse [Polly was her pet name] had but taken his fancy for a moment, because he could not pass such a woman by and deem himself still a true Virginian."

Polly may have been more than a passing fancy, but, apparently, Washington was reluctant to press his advantage. In 1757 his friend Joseph Chew, in response to a letter from Washington, implored him to see "whether the Works were sufficient to withstand a Vigorous Attack, you a Soldier and a Lover. . . ." But Washington's emotions had by then settled on an impossible objective, the wife of George William Fairfax.

Attractive, cultured, vivacious, Sally Fairfax brought

George Washington (after Charles Willson Peale) at an age when his mind was often on the ladies.

to the Fairfax estate, Belvoir, a sparkle that shone to nearby Mount Vernon. An unknown painter portrayed her holding a rose and wearing a gown daringly décolleté. If the artist was trying to paint a coquettish Sally, he failed with her face. He made it long and angular, the features too tightly drawn and ill-proportioned. Yet there is a hint of what it could have been. In other hands the portrait might have revealed a Colonial Scarlett O'Hara.

Their correspondence began in the spring of 1755, when Washington, then 23, was on his way north to serve with General Edward Braddock. The young cavalier stopped at his Bullskin plantation in northern Virginia and sent Sally the message that he intended to write to her during the campaign. A letter from Fort Cumberland two weeks later twitted Sally for failing to make a more favorable impression on General Braddock "at the late review in Alexandria." Would this goad her into writing? "I hope you will favour me with your corrispondance," he pleaded.

In May he rode from Fort Cumberland to Williamsburg to get money for Braddock's dispirited troops. This afforded him the opportunity to stop at Belvoir, even if it meant going out of his way. While there, he borrowed a horse from Sally and promised to write her on his safe return. But naive of the adroit ways of a married woman two years his senior, Washington did not understand why she wanted him to write her through a third party. He said so in this letter from Fort Cumberland:

"Dear Madam: When I had the pleasure to see you last, you express'd an Inclination to be informed of my safe arrival at Camp with the charge that was entrusted to my care; but at the same time desir'd it might be communicated in a Letter to some body of your acquaintance. This I took as a Gentle rebuke and polite manner of forbidding me corrisponding with you. . . ."

Three weeks later Washington "was seiz'd with viol't Fevers," made none the better for lack of an encouraging word from Belvoir. In a long letter to his brother John Augustine at Mount Vernon, he alluded to this lack with a note of sarcasm: "You may thank my f'ds for the Lett'rs I have rec'd w'ch has not been one from any Mortal since I left Fairfax, except yourself and Mr. Dalton."

It was a bad time for love and a worse time for war. Washington, still weak and gaunt, rode in a wagon to the front of Braddock's strung-out line of march. The next day, July 9, on the northern bank of the Monongahela, Braddock's army was decimated by flanking fire from the hidden French and Indians.

To John Augustine at Mount Vernon—and by inference to those unforgettable friends at Belvoir—Washington sent word that he was safe: "As I have heard since my arriv'l at this place, a circumstantial acct. of my death and dying speech, I take this early opportunity of contradicting both, and of assuring you that I now exist and appear in the land of the living. . . ." On July 26 he reached Mount Vernon. A note from Belvoir arrived the same day.

It was from William Fairfax, Sally's father-in-law. The ladies of Belvoir, he said, were anxious to see

Sally Fairfax, based on a portrait by an anonymous primitive artist. The flower suggests coquetry.

Comb Sally's hair, round her chin and shade her eyes, and *voilà*—a glamorous belle of old Virginia.

Washington. And Sally herself added a postscript: "After thanking Heaven for your safe return I must accuse you of great unkindness in refusing us the pleasure of seeing you this night. I do assure you nothing but our being satisfied that our Company would be disagreable should prevent us from trying if our Legs would not carry us to Mount Virnon this Night, but if you will not come to us tomorrow Morning very early we shall be at Mount Virnon."

Washington had drawn blood. Whether in a pique or fatigued from his long ride, this time he had chosen not to go out of his way to Belvoir. And a lady scorned dropped her guard to expose her disappointment. She got two houseguests to be cosignatories of the postscript. Still, the handwriting was Sally's.

In the fall of 1757 George William Fairfax had to sail across the treacherous Atlantic to look after his inheritance in England. His father had died in September. Now Sally was alone at Belvoir. George Washington was alone at Mount Vernon. But he was a very sick man, for he had recently "labour'd under a Bloody Flux . . . attended with bad Fevers. . . ."

Yet he summoned up enough strength to compose a lengthy note to Sally Fairfax, seeking to borrow a recipe for jelly. It was a masterful letter, one which no prying husband or historian might censure: ". . . I have no person that has been used to making these kind of things, and no directions, I find myself under a necessity of applying to you for your Rec't Book for a little while, and indeed for such materials to make jellies as you think I may not at the time have. . . ."

George meets Martha

February 1758 saw him "beginning to master the Infirmity." On the 13th of that month he received word that George William Fairfax had arrived safely in London. He sent the letter to Sally with this message: "When you are at leizure to favour us with a visit we shall endeavor to partake as much as possible of the joy you receive on this Occasion." His ledger records a tip to Sally's servants on that date, indicating that he made her a visit.

In March Washington rode to Williamsburg—a momentous journey, for it led him several times to the home of plump Martha Dandridge Custis, widowed not quite a year and said to be one of the richest women in Virginia. This time there was no faltering as there had been with Polly Philipse. George swept Martha—whom he later called Patsy—off her feet.

With a fond adieu from his Patsy, George, healthy again, returned to the frontier in April, but first posted an order to a London tailor. In May he purchased a ring, and then began the massive enlarging and refurbishing of Mount Vernon. Overseeing the construction was George William Fairfax, returned from England. From him Sally must have heard a day-by-day report of the mansion's transformation. And she must have wondered about the days when George Washington would again live there, although no longer alone.

Sally had known him since she was married; and she was truly his mentor. She had introduced him to the classics, instructed him in the social graces, polished his awkward manner. Probably she was even responsible for his improved spelling. But neither Sally nor George dared resist the social laws to which they were bred. A humble yeoman might steal another's wife and fare all the merrier. Not so a Virginia gentleman. When Sally saw the construction at Mount Vernon, all she could do was spit a little fire. What she wrote has been lost. But Washington's response

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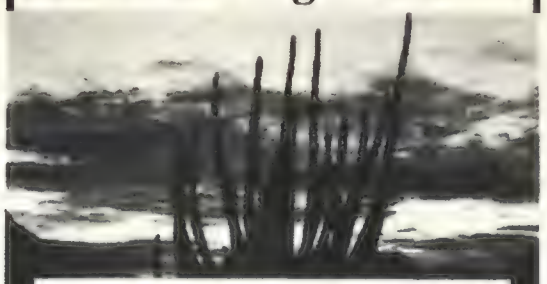

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NEW MEXICO

Continued from page 95

indicated that she taunted him about Martha as well as another young widow, Mrs. John Spotswood, then entertaining the men in camp. It moved Washington to compose one of history's most remarkable love letters:

Camp at Fort Cumberland, 12th. Septr. 1758—

Dear Madam

Yesterday I was honourd with your short, but very agreable favour of the first Inst.—how joyfully I catch at the happy occasion of renewing a Corrispondance which I feard was dis-relished on your part. . . . In silence I now express my Joy. . . .

If you allow that any honour can be derived from my opposition to Our System of management you destroy the merit of it entirely in me by attributing my anxiety to the annimating prospect of possessing Mrs. Custis, when—I need not name it. Guess yourself. . . . Tis true, I profess myself a Votary to Love. I acknowledge that a Lady is in the Case—and further I confess, that this Lady is known to you. Yes, Madam, as well as she is to one who is too sensible of her Charms to deny the Power whose Influence he feels and must ever submit to. I feel the force of her amiable beauties in the recollection of a thousand tender passages that I coud wish to obliterate, till I am bid to revive them.—but experience, alas! sadly reminds me how Impossible this is and evinces an Opinion which I have long entertaind, that there is a Destiny, which has the Sovereign controul of our Actions—not to be resisted by the strongest efforts of Human Nature.—

You have drawn me my dear Madam, or rather have I drawn myself, into an honest confession of a Simple Fact, Misconstrue not my meaning—'tis obvious—doubt it not, nor expose it. The World has no business to know the object of my Love, declard in this manner to you when I want to conceal it. One thing above all things in this World I wish to know, and only one person of your Acquaintance can solve me that or guess my meaning. But adieu to this, till happier times, if I ever shall see them. . . . I dare believe you are as happy as you say—I wish I was happy also. Mirth, good Humor, ease of Mind and—what else? cannot

fail to render you so, and consummate your Wishes. . . .

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Go: Washington

This letter, unlike others Washington had written to Sally, was promptly answered. And again, the contents of her reply—lost or destroyed—can be partially reconstructed from Washington's response: "Do we still misunderstand the true meaning of each other's Letters?" he asked. "I think it must appear so, tho' I would feign hope the contrary as I cannot speak plainer without—but I'll say no more, and leave you to guess the rest."

Pretty Betsy Fauntleroy said "no" to George's youthful wooing.

Honor on the field of battle Washington could satisfy. But he could not conquer his love for Sally, not even in these closing lines, the last he would write to her for 25 years: "One thing more and then I have done. You asked if I am not tired at the length of your Letter? No, Madam, I am not, nor never can be while the Lines are an Inch asunder to bring you in haste to the end of the paper. . . . Adieu dear Madam, you possibly will hear something of me, or from me before we shall meet." He and Sally continued to see each other—it could hardly be avoided—and Washington noted the occasions: "Mrs. Fairfax arrived . . . Mrs. Fairfax went home in the Chariot. . . . Visited at

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Belvoir to day. . . . Colo. Fairfax and Mrs. Fairfax Dind here. . . . Went to Church and Dind at Belvoir."

In 1760 the good neighbors were separated, perhaps mercifully so, for it would have been almost superhuman for two people in love to continue their relationship on a purely platonic level. Sally and her husband sailed to England, ostensibly to further his claims to an earldom.

Wealthy Polly Philipse also turned down the gallant colonel.

After returning to Belvoir, she encouraged George William to establish residence in England the better to pursue that goal. The reason was a good one if not necessarily the true one, as the move would put an ocean between her and Mount Vernon. In July 1773, Sally and George William Fairfax left Belvoir forever. Washington must have felt relief as well as sorrow.

In later years he several times made oblique reference to his passionate nature. To a woman who had sent him a laudatory poem, he responded with mischievous double entendre: "You see, Madam, when once the woman has tempted us, and we have tasted the forbidden fruit, there is no such thing as checking our appetites, whatever the consequences may be." And to his two step-granddaughters he gave advice on matters of the heart. "The passions of your sex are easier raised

than allayed," he cautioned Nelly Custis. "Do not therefore boast too soon or too strongly of your insensibility to, or resistance of, its powers. In the composition of the human frame there is a good deal of inflammable matter, however dormant it may lie for a time, and like an intimate acquaintance of yours, when the torch is put to it, *that* which is *within you* may burst into a blaze. . . ."

At Mount Vernon, on May 16, 1798, 19 months before he died, he wrote Sally Fairfax once more: "My dear Madam: Five and twenty years, nearly, have passed away since I have considered myself as the permanent resident of this place; or have been in a situation to endulge myself in a familiar intercourse with my friends, by letter or otherwise.

"During this period, so many important events have occured, and such changes in men and things have taken place, as the compass of a letter would give you but an inadequate idea of. None of which events, however, nor all of them together, have been able to eradicate from my mind, the recollection of those happy moments, the happiest in my life, which I have enjoyed in your company."

Sally, 68 years of age and long a widow, put this letter in a trunk with the others she had carefully saved. When she died 13 years later, her legacy amounted to little more than a few personal belongings and these faded letters that George Washington had probably thought were long ago destroyed.

Well-endowed Martha (Patsy) Custis, here unwigged, said "yes" in 1758.

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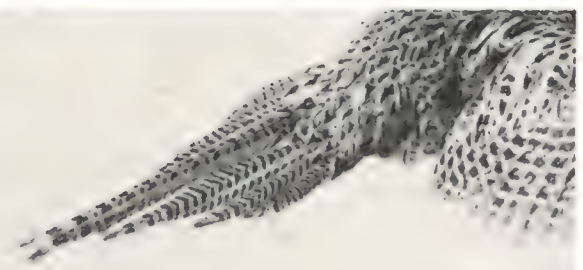

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Book reviews

Humboldt and the Cosmos
Douglas Botting
(Harper & Row, $15)

Today many scientists are modest in manner and habits, devoted to family and community, and quite cautious about taking on too many topics for inquiry lest they become overcommitted. None of these prosaic qualities appeared in Baron Alexander von Humboldt, a naturalist-adventurer, confidant of kings, lion of Parisian salons and voyager over exotic continents as well as wide seas of thought.

His name soon burst into prominence throughout all of Europe after he set a world record, in 1802, by climbing more than 19,000 feet on Chimborazo in Ecuador, then thought to be the world's highest mountain. Thereafter, following false reports of his death, he returned to Europe laden with 45 cases of specimens and bursting with discoveries gained in the course of five years' exploration in South America. Almost 30 years of arduous work and most of his fortune were consumed in preparation of a series of splendid reports on the New World, including his discoveries in zoology, botany, geology, astronomy and meteorology.

Douglas Botting, his latest biographer, repeated Humboldt's South American travels on the Orinoco River and Casiquiare Canal, enabling him to offer a vivid portrayal of the jungles and cataracts traversed by his predecessor, and an account of biting insects so fierce that the reader feels almost physically spared. One wants to know what manner of man would expose himself uncomplainingly to danger and exhaustion for years at a time. It is the principal strength of this

unusually good and splendidly illustrated scientific biography that it develops the human qualities of its subject. Humboldt's early years reveal a romantic intensity given over to homosexual yearnings, disappointed by a young German officer's failure to reciprocate. After his mother's death left him financially independent, Humboldt was free to travel the widest reaches of the globe. Even at the age of 60, we find him setting out for a trip across Siberia to the edge of Mongolia and China, and being saluted on his return to St. Petersburg by Czar Nicholas I as a "life-giving influence" wherever he went.

Humboldt should be of particular interest to today's readers because he was one of the first among biologists to perceive the interrelatedness of living things in the manner that has developed into the science of ecology. While climbing mountains in the tropics he confirmed that vegetation changes according to climate: Different varieties of plants were found at progressively higher altitudes in a manner corresponding to their distribution latitudinally from the equator to the poles. In the 1840s he began publishing a sweeping review of the forces of the universe, a five-volume work to which he gave the title *Cosmos*—aiming to show the public that all living things formed one great whole and were linked to their physical setting in numerous ways.

He maintained also that the study of nature should be open to the enlivening

Humboldt, at age 26, by François Gérard

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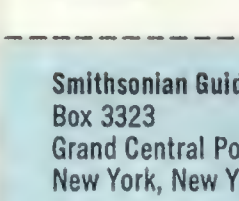

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influence of poetry and the arts–in particular, he hoped that landscape painters would make their way to "the humid mountain valleys of the tropical world, to seize, with the genuine freshness of a pure and youthful spirit, on the true image of the varied forms of nature." Neither the alliance of art with science nor the orientation of biology to the broader manner of ecological inquiry sought by Humboldt was to flourish in the century following his death in 1859. Instead, with a few exceptions such as Darwin, the range of study narrowed and specialization overtook the life sciences.

It need not have happened and would not have if Humboldt had attracted sufficient followers to pursue the world of nature with his all-embracing vision.

—Philip C. Ritterbush
Director, Center for the Study of Popular Education and Recreation, Wallpack Village, New Jersey

Before Civilization
Colin Renfrew
(Knopf, $8.95)

This new synthesis of major developments in European prehistory makes fascinating reading for scientist and layman, and should provide us with new directions in the reconstruction of European prehistory. The book owes its genesis to two developments in American scholarship. The first is the recent "recalibration" of dates obtained by the radiocarbon method; the second is the development of new theoretical frameworks in archaeological reconstruction.

The discovery that carbon-14 could be measured and used to provide an estimate of the time elapsed since the death of an organism was the basis for the first "radiocarbon revolution." On this discovery was erected the entire framework of the prehistory of *Homo sapiens.* But because of more recent research, we now know that the level of carbon-14 in the atmosphere was not always the same as it is today. It was once much higher, and the resultant higher-than-expected concentration of carbon-14 in the organisms of the past had led us to assume that they were not as old as they really were.

This recalibration of radiocarbon dates, the "second radiocarbon revolution," has had its greatest effect where history and prehistory meet. At this point, the "bar-

barian" cultures of western and central Europe are all older than their supposed prototypes in the Near East and Aegean.

To European scholar Colin Renfrew, it is as if a "time fault" had pushed back the cultures of barbarian Europe several centuries earlier than the cultures of the Near East and Aegean. Within each geographical area, the age of the cultures relative to each other remains the same. But the links between the areas are severed. No longer can Aegean colonists be seen as the inspiration behind the stone tombs of Iberia and Brittany or the early copper age of the middle Danube. Nor can Mycenaean traders be held responsible for Stonehenge or the megalithic temples of Malta.

We are forced to turn from a "diffusionist" or historical explanation of the technological and cultural achievements of the early European cultures, in which the emphasis is on *where* an innovation came from and *when,* to *how* an innovation was arrived at and *why*.

The new paradigm in the reconstruction of European prehistory is unfolded in detail in the latter half of the book. One example is Renfrew's discussion of the megalithic cultures of western Europe. Suddenly the megalithic monuments, great and small, of Britain, Denmark, Brittany and Iberia must be seen as the earliest great stone monuments in the world, antedating the Egyptian pyramids l y as much as 1,900 years in Brittany. The cultures which produced them are comparable only in their common economic and technological level—and in their common tradition of stone burial chambers.

The dissimilarity evident in the very details of stone construction suggests to Renfrew the independent development of local traditions. What is harder to explain is the social context in which the idea of expending such effort on stone monuments became popular and even vital to a local community. In an examination of the distribution of tombs on the islands of Rousay and Arran, off the Scottish coast, Renfrew suggests that each monument was the focus of a local territory supporting between 25 and 70 persons, and that the labor involved in building them was the result of cooperative effort. But in order to draw the territorial boundaries on Rousay and Arran so that each includes one tomb and some arable land, Renfrew must place several tombs which are only a few dozen yards apart in

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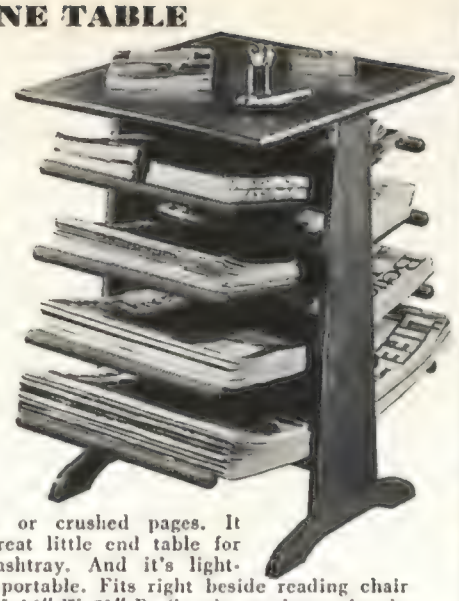

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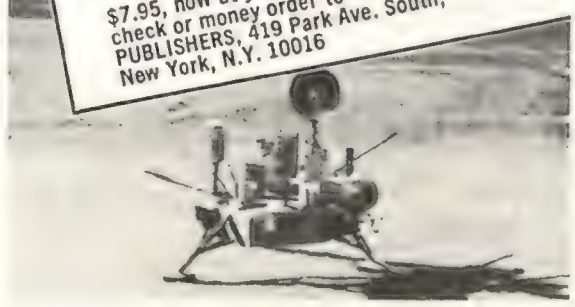

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separate territories, and one or two territories are improbably small or have no access to the sea.

Like many theories, this one and the others presented to explain the megalithic temples of Malta, the beginning of metallurgy in southeast Europe, the emergence of civilization in the Aegean and the astronomically precise designs of Stonehenge are considerably more attractive in outline than in detail.

Also, Renfrew is guilty of the very sin which he cautions against: the uncritical use of ethnographic parallels. One cannot arrive at a population estimate for a Scottish island which lies 11 degrees below the Arctic Circle by using the number of people supported by slash-and-burn agriculture on an acre of land in central Africa. Nor is Easter Island strictly comparable to Malta.

Yet the importance of Renfrew's central point—that of explaining European development in European terms—is not to be underestimated or negated by these minor criticisms. In questioning so many of our assumptions about the development of European prehistory, he has written a thoroughly compelling book.

—Alison S. Brooks
Assistant Professor of Anthropology,
George Washington University

Theatres
An Architectural & Cultural History
Simon Tidworth
(Praeger, $18.50)

When Europeans desired to hear great actors they went to England; when the English wanted to see beautiful theaters they traveled to the Continent—to see the Greek theaters of 300-100 B.C., the Roman theaters from A.D. 100-300, and the theaters of Renaissance Italy. Having myself seen many of the structures illustrated in this book, I am grateful to Simon Tidworth for giving me a clear idea of what occurred in them.

Despite the fact that it is architecture with which the author is chiefly involved, and the flow of social and political tides enveloping that architecture, he is informed and aware of drama as an art in itself. He tells us, for instance, about the headaches of the Roman playwrights Plautus and Terence, the former doing his best to win attention away from clowns, acrobats and conjurors, and the

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latter complaining that "The first part was doing well when news arrived that there was to be a gladiators' show. Off rushed my audience, pushing, shouting, jostling for a place. . . ."

The story is picked up and continued around the tenth century when the Church began dramatizing the Mass with bits of dialogue, eventually including props, costumes and utilizing the entire space of a church to complete the spectacle. Later, the Church decided it was best to let the shows take place in the market and allow laymen, the craft guilds and fraternities to take over. Mr. Tidworth illustrates this "theatre without theatres" with fine diagrams showing how the productions functioned.

Glorious as the structures of the Renaissance may have been to see, there was little to hear of the spoken word. Leonardo da Vinci invented revolving mountain machinery, architects designed scenery, orchestras were used for horse ballets and other spectacles. But the plays of Molière, Racine and Corneille were performed in small halls where performance conditions were primitive—not much more elaborate than London's Globe where the Elizabethan playwrights held forth. Good plays seldom reached splendid auditoriums nor did good actors necessarily want them.

But everyone enjoys spectacles and showing themselves off; there are, therefore, many pages devoted to the opera houses that proliferated in Italy and Germany throughout the 19th century, culminating in the "mightiest monster of them all," the Paris Opéra. There were, however, those who did not believe that grandeur was more important than function and a chapter is given to Richard Wagner, whose opera house at Bayreuth, built in the 1870s, changed the design of theaters radically.

In the final section of this concise and very useful history, present-day experimental theater is discussed. The avant-garde, deeply influenced by the revolutionary ideas of the French actor-director Antonin Artaud, wishes for no theater beyond an empty space in a loft, garage or warehouse. Since many of the "happenings" now being performed are didactic or moralistic in purpose, the author is justified in comparing them with the miracle plays of the Middle Ages.

Simon Tidworth has written an uncommonly witty and good-tempered

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(Houghton Mifflin, $8.95)

This simple account of a brief trip to Antarctica is as personal as a home movie. There are no peaks of excitement and barely any structure. Nevertheless, former diplomat Louis J. Halle should fascinate and stimulate even the most blasé guest at his travel show. Halle's vivacious description takes you along on the ice-breaker, ski plane and helicopter; his asides about history, evolution and the wildlife make him a superb guide.

A first visit to the ice-ringed continent at the bottom of the globe always holds some surprises, but there were relatively few for Halle, who anticipated this three-week experience with 40 years of reading. Yet even he was awed by the loneliness amid the ice, and perplexed by the wind-swept "dry valleys," where eroded pillars of rock and near-sterile soil resemble the surface of some alien planet.

Primarily, Halle went south to see the natives of sea and ice—fast-disappearing whales and prolific plankton, albatrosses with 11½-foot wingspans, and the remarkably adapted seals and penguins.

Perhaps Halle's greatest contribution is his unpretentious empathy with the creatures he observes. Without affectation, he speaks of whales as the brothers of men. He makes us feel the kinship, too, and we shudder at the inhumanity of relentless modern whalers. Taking the viewpoint of a penguin, Halle makes it seem logical that danger should lie primarily in the sea; so we find it natural that the comic Adélies and ponderous Emperors view men and dogs with curiosity rather than fear. Most impressively, Halle describes soaring seabirds. While he confirms scientific dogma that such birds *can* sail on the breeze for hours without ever flapping their wings, Halle remarks that they rarely do, because an occasional flap makes it easier to maneuver.

If Halle shows any lack of understanding, it is an occasional intolerance of *Homo sapiens*. He is exasperated by a

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man at McMurdo Station who fails to detail an unusual bird sighting because he is "a physicist, not an ornithologist." Perhaps because of his own background as a State Department official, the naturalist-author also worries (unduly, I think) that signatories to the Antarctic Treaty may not continue to live up to the demilitarization and conservation pledges they have made. In fact, Halle strangely omits some of the significant international agreements on wildlife protection from his appendices.

Antarctica is still an outdoor classroom. Geophysicists have as much right there as bird watchers; and—with proper ground rules—commercial tourists should be able to enjoy it, too, just as Halle did under the professional auspices of the National Science Foundation. Ideally, though, every visitor should try to approach the immaculate wilderness with the reverence expressed in this book.

—*Joseph M. Dukert*
Author of *This is Antarctica*

Autumn of the Eagle
George Laycock
(Scribner's, $6.95)

The bald eagle, the national emblem of the United States, is a bird of noble mien as it perches imperiously on a lofty tree or circles high in the sky, white head and tail feathers flashing in the sun. Unfortunately, it has decreased tremendously in numbers as a result of logging, shooting and, especially, the ill effects of certain pesticides.

A good popular book about the bald eagle was needed; Mr. Laycock has provided it. He first summarizes the habits and haunts of the bird and its life history. This is followed by chapters on special studies of the eagle and of the problems facing it: Francis H. Herrick's pioneering observations of its nesting habits; the remarkable exploits of Charles L. Broley in banding the declining eagles of Florida; and the ways of eagles in their last great stronghold, coastal Alaska and British Columbia (even there they are threatened by logging and mining operations).

Mr. Laycock has traveled widely and consulted with many of the biologists concerned with this species. In view of the excesses brought to light within the last few years, one can understand why he states that ranchers or their agents "ex-

ecute" rather than shoot eagles. However, ranchers in Florida have cooperated in protecting eagles and, as Mr. Laycock notes, some Western ranchers are sympathetic to birds of prey. We must try to educate the others, at the same time remembering that wildlife is more prevalent on ranches than in orange groves.

Everything considered, one must be somewhat despondent about the future of the bald eagle. Still, I find Mr. Laycock's book, as indicated by the title itself, to be perhaps overly pessimistic. In the chapter on the all-important problem of pesticides, he notes that there has been a ban imposed on DDT, but the implication is that it is being replaced by even worse chlorinated compounds. Not a word about the fact that there has been a significant cutback in many regions in the use of such compounds, and some indication that the reduction is proving beneficial, for example, to peregrine falcons in Great Britain, ospreys on Long Island, and harrier and Cooper's hawks in the Eastern United States.

More to the point, in New York State (which Mr. Laycock does not include in his list of bald eagles' breeding places), a pair succeeded in raising one offspring in 1973 after at least eight years of failure. Even Lake Erie, I was told while looking for shorebirds there recently, is improving as a result of antipollution efforts and the diluting effects of the highest water levels in years. So perhaps there is hope for the few remaining eagles along the shores of that lake, where Herrick conducted his classic studies decades ago.

The bald eagle has thus become a symbol not only of the nation, but of our efforts to save the environment. In the long run the success of these efforts may be as vital to us as to the eagles.

—Dean Amadon

Lamont Curator of Birds, The American Museum of Natural History

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Skylab Launch: View the launch of Skylab 4; tour NASA facilities at Cape Kennedy—early November.

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For detailed information on Foreign Tours, write Miss Bliss Schumann, Room SI 123; for Domestic Tour information, write Mrs. Diana Parker, Room SI 106, both at Smithsonian Institution, Washington, D.C. 20560.

Smithsonian highlights

National Air and Space Museum, Arts and Industries Building

"Air Traffic Control" is a new exhibit showing the growth of air traffic control in the United States. It includes a re-creation of the first federal air traffic control center, radar equipment, a talking mannequin and a theater in which air traffic control procedures are demonstrated while viewers take a simulated flight from Pittsburgh to Washington, D.C.—opens November 16.

"Space and the Artists" is a continuing exhibition of astronautical paintings and sculptures in the West Hall balcony. The works of 20 artists are featured.

Museum of Natural History

"Studies of South African Costume" is an exhibition of watercolors depicting costumes worn by 11 different tribes. Verda V. Peters and her daughter, Olemara Peters, have made four expeditions to South Africa and painted more than 800 pictures of this unique, traditional tribal dress. Complementing the paintings is a small collection of South African artifacts —opens in early November.

"Orchids," a collection of 25 orchid paintings by the British botanical artist James E. Walford, continues through November 30 in the second-floor gallery.

National Collection of Fine Arts

"NCFA Open House" gives the public a chance to observe the inner workings of an art museum. The event includes tours, demonstrations, films, lectures and refreshments—Sunday, November 4, 2:00 to 5:00 P.M.

Museum of History and Technology
"Triumph over Disability: Two Hundred Years of Physical Medicine in the United States" is a continuing, major exhibit showing the development of rehabilitative medicine in the United States. It covers historical and contemporary methods of therapeutic medicine involving heat, light exercise and massage. A modern hospital gymnasium, prosthetic limbs, pacemakers and mechanical hearts are included in the exhibit. Stories of famous Americans who have overcome physical disabilities are also featured.

Early 19th-century silver ear trumpet, from medical exhibit, used by the late Senator James Bayard of Delaware.

"New Images 1839-1973," the first in a series of special exhibitions in the print gallery of the Hall of Photography, continues through November 22. It illustrates the revival by contemporary photographers of early photographic processes and techniques.

Puppet Theater
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Many performances are preceded by free afternoon workshops at 4:30 P.M. For information about workshops and evening performances, call (202) 381-5395.

Renwick Gallery

"Shaker: Furniture and Objects; Textiles and Costumes; Inspirational Drawings" is an exhibit commemorating the bicentennial anniversary of the founding of the Shaker community—opens November 2.

"Boxes and Bowls: Decorated Containers by 19th-century Haida, Tlingit and Tsimshian Indian artists" is a collection of wooden bowls adorned with shells, carvings and stains—opens November 16.

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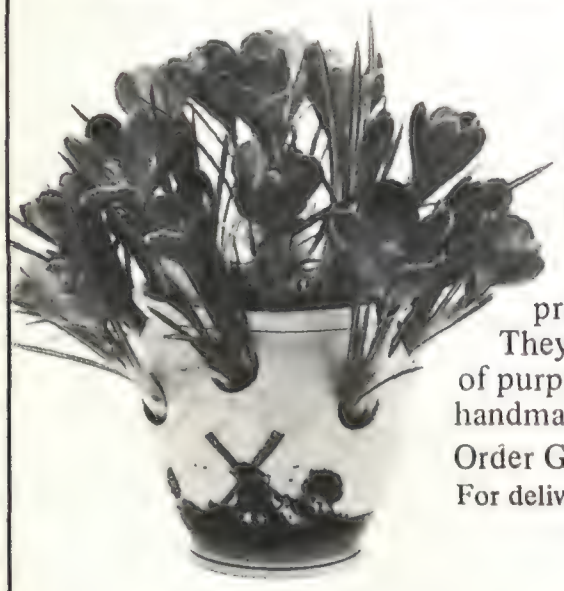

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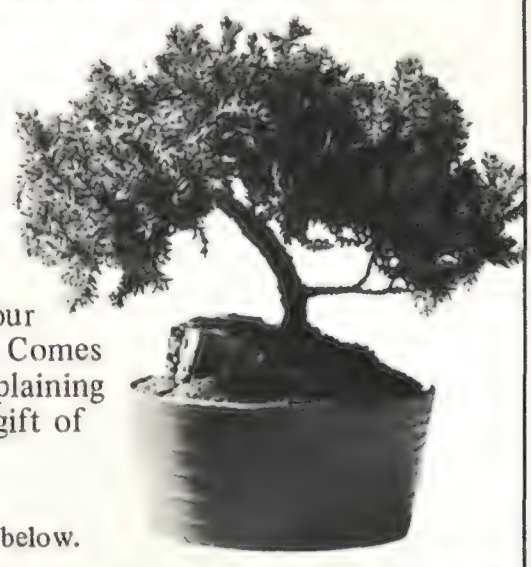

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Smithsonian Speakers

The National Speakers Bureau is a service provided by Smithsonian Associates which offers an opportunity for organizations within the United States to request curators and other Smithsonian Staff members to lecture on a wide spectrum of disciplines. Travel and other expenses are paid by participating organizations. Write: National Speakers Bureau, Smithsonian Associates, Smithsonian Institution, SI 118, Washington, D.C. 20560.

Traveling Exhibition Service

There are up to 70 different Smithsonian-sponsored exhibitions on display each month throughout the United States and Canada. For a complete listing and information on how to bring an exhibit to your area, write: Traveling Exhibition Service, Smithsonian Institution, Washington, D.C. 20560.

- Oakland, California—"William H. Johnson" (The Oakland Museum, Nov. 10-Dec. 9).
- New York, New York—"Permutations: Earth, Sea, Sky" (New York Cultural Center, Nov. 7-Dec. 9).
- Lamoni, Iowa—"Contemporary African Printmakers" (Graceland College, Nov. 10-Dec. 9).
- Salem, Massachusetts—"Alexey Brodovitch and His Influence" (Salem State College, Nov. 17-Dec. 16).
- Pensacola, Florida—"Handicrafts of the Southeast" (Historic Pensacola Preservation, Nov. 17-Feb. 10).
- Cleveland, Ohio—"The Five Sense Store" (Supplementary Education Center, Nov. 17-Dec. 30).
- Grand Island, Nebraska—"Our Only World" (Stuhr Museum, Nov. 17-Dec. 16).

Associates' Events

"Chinese Art: A Weekend Seminar" is being led by Joan Stanley-Baker, an author and eminent art critic. The seminar will begin November 17 at 10:00 A.M. For information, call (202) 381-5157.

Smithsonian Commons

Luncheon facilities for Smithsonian Associates are in the original Smithsonian Building. Open Monday through Friday from 11:30 A.M. to 2:00 P.M., the Commons offers a buffet luncheon from $1.50 to $1.95. Also available are coffee and pastries from 10:00 to 11:00 A.M., and tea and pastries from 2:30 to 4:30 P.M.

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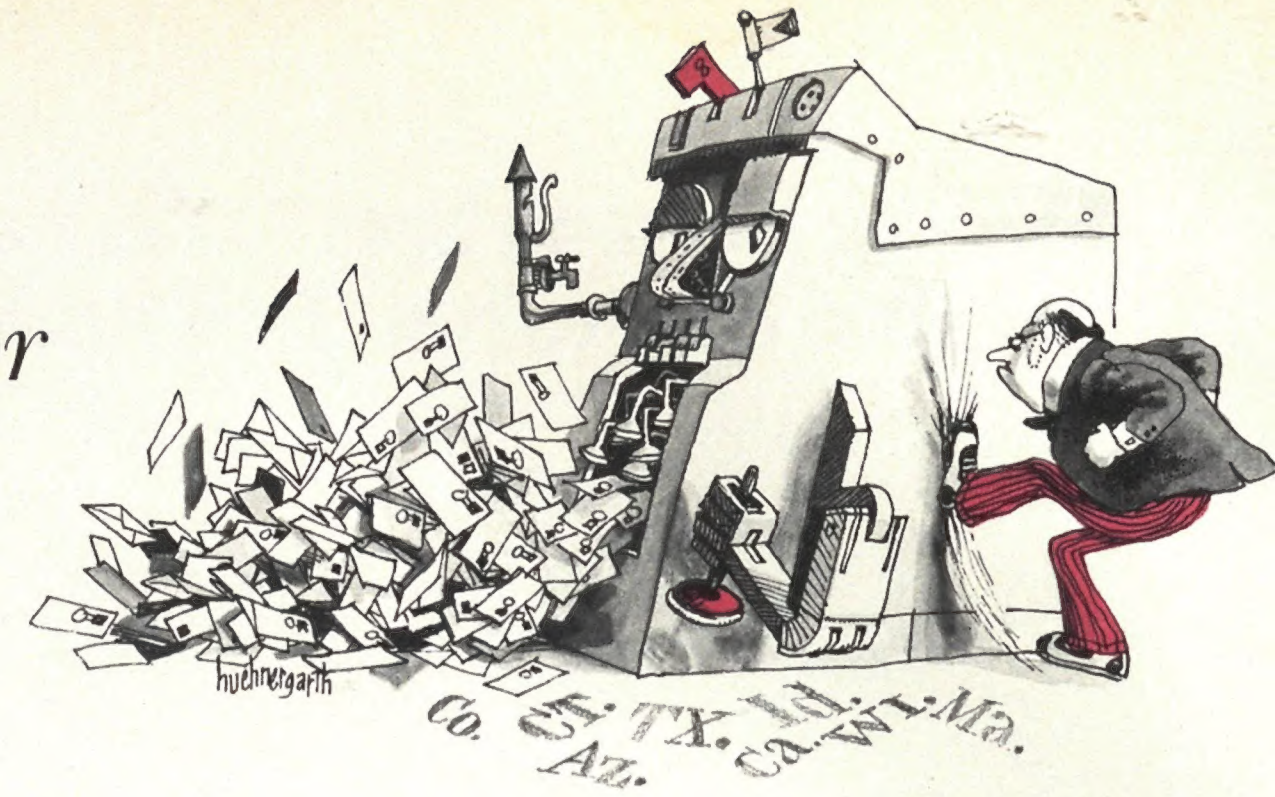
Exxon made this station available to the OIC as a job training center and we've underwritten many of the costs. We think it's one of our best investments.

By H. Allen Smith

Neither Sn nor Ra nor Ht nor Gl of Nt



When I was a teen-ager working at my first newspaper job in an Indiana town, I knew a man in the local post office and sometimes when I finished with my own chores, I'd go sit beside him and watch him shove letters and postcards into pigeonholes. He was a fascinating friend because he could talk educationally, in the rhythmic accents of an auctioneer, at the same time he was reading names and addresses and hitting the right pigeonholes.

His monologues were a delight, touching on life and love and carp fishin' and science and religion and bass fishin' and politics and bodily ailments and the weather and, mostly, the post office. So it came about that I learned a great deal concerning the inner workings of that service and down through the years I have been a staunch friend of all postal workers.

There has been a lot of niggling criticism of the post office people in the last few years, just as there has been wailing about shortages of meat and plumbers and bread and gasoline and soybeans and mortgage money and stonemasons, but I have refused to join in because, of course, I know the true reason for the discontent just the way Malthus had it pegged: *too many people.*

The blame, then, for sluggish mail service does not properly belong with the post office people. Yet they are beginning to lose me as their advocate. They are getting out of hand, carrying things too far. As a general rule I keep my hands off the government, but when the government tries to remove what little poetry and sublime radiance we have left in our lives, I am prepared to mount the barricades. What I have in mind is the changing of state abbreviations.

I still refuse to use the new ones. My whole life has been dedicated to calling California Calif. Calif is a benign and pleasing abbreviation, suggesting the mystic aura of an Ottoman harem and monkey business in a Turkish garden. Now they ordain that I must write Ca. As in San Francisco, Ca. What in the name of time does Ca do for a man's poetic sensitivity? It is the sound of an idiot crow hollering in the woods.

Take Colo, where I lived as a dreamy-eyed young man. There's a certain lyric quality to Colo that vanishes when we reduce it, under government fiat, to Co. All I can think of when I write it Denver, Co, is an ugly efflorescence of heavy industry in the Rockies.

Ugliness where once there was spiritual lift, as in Mass, which is now Ma, and Ala. Praise Ala? Of course. But praise Al? Not at my house.

And Ariz. There's a colloquial expression that, in the back country, suggests standing up, or getting out of bed, or up-from-the-tomb. Look at it today. Az. I'll never do it. I'll quit writing to people before I'll consign them to life in Az.

And consider Conn. It always made me think of glistening band instruments, and now it is Ct. Willimantic, Ct? Not from me. Not even a postcard.

Wi can never be Wi to me but always and forever the wistful Wis. Mich, with its flavor of the Left Bank "Boul' Mich," will not appear on my envelopes as Mi.

Ore, which somehow always suggested to me a quiet pig-iron strength, now has become Or.

Or what? Or Washington?

There are others on the list that jar my sweetbreads, so count me now as a reactionary. Put me down as a fellow who clings to the old ways. Somebody told me that the Post Office Department inaugurated the two-letter abbreviations because of the computers they are now using. So, I say to them, get rid of the computers.

If somebody wants to give me an argument, please don't address me in Tx. Nor even in Tex. Make it read loud and clear and full-flavored: Texas. Ut me no Uts, Id me no Ids, In me no Ins, and Ok me no Oks. And don't get me started on computers. I said at the outset that they'd never amount to a damn till they learned to go downstairs for a coffee break.

Photographed at Round Hill, Montego Bay, Jamaica, W.I.

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QUESTION: "In general, of the brands you are familiar with, which one would you say requires the fewest repairs?"

ANSWERS:

Zenith	**35%**
Brand A	14%
Brand B	11%
Brand C	5%
Brand D	3%
Brand E	3%
Brand F	2%
Brand G	2%
Brand H	2%
Brand I	1%
Other Brands	3%
About Equal	13%
Don't Know	11%

QUESTION: "If you were buying a new color TV set for yourself today, which brand would you buy?"

ANSWERS:

Zenith	**35%**
Brand A	23%
Brand B	12%
Brand D	6%
Brand C	4%
Brand E	4%
Brand F	3%
Brand G	3%
Brand H	2%
Brand I	2%
Other Brands	6%
Don't Know	8%

NOTE: Answers total more than 100% because some service technicians named more than one brand.

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How the survey was made.

For the second consecutive year, one of the best known research firms in America conducted a study of independent TV service technicians' attitudes toward brands of color television. And again Zenith was the number one brand named in answer to each question, as shown in the charts. Telephone interviews were conducted with TV service technicians themselves in April, 1972, and again in April, 1973, in more than 170 cities from coast to coast. To eliminate the factor of loyalty to a single brand, the study included only shops which serviced more than one brand of TV.

We want to hear from you.

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But if it should ever happen that a Zenith product doesn't live up to your expectations – or if you would like additional details of the service technicians' survey – we want to hear from you. Write to the Vice President, Consumer Affairs, Zenith Radio Corporation, 1900 N. Austin Ave., Chicago, Ill. 60639.

We'll give your request our personal attention.